GOLDACRES

CHANGE THE WAY YOU SPRAY

Special Evolution

Operators Manual

For further information about any of the products shown please visit - www.goldacres.com.au.

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Goldacres Trading Pty Ltd
3 Morang Crescent
Mitchell Park Vic 3355

Ph: 03 5342 6399
Fax: 03 5342 6308

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Chapter 1

INTRODUCTION

Welcome

Congratulations on your purchase of a Goldacres sprayer. The Goldacres brand has been established through more than a quarter of a century of supplying Australian farmers with quality, innovative and technologically advanced spraying equipment - designed in Australia for Australian conditions.

Goldacres not only produce Australia's finest range of spraying equipment - we value the relationship with the owners of our equipment. We are pleased to have you as a Goldacres owner and look forward to making your spray applications as efficient as possible.

Please use this comprehensive resource to gain a full understanding of your equipment, and don't hesitate to contact your Goldacres dealer or Goldacres for further information.

Roger Richards
Engineering Manager
Goldacres Ballarat

Goldacres/Pathway - Terms and Conditions of Sale

Goldacres/Pathway Goods are only available for purchase upon the terms and conditions set out below.

Interpretation

1. In these warranty terms and conditions:
(1) "Goldacres" or "Pathway" means Goldacres Trading Pty. Ltd. A.C.N. 061 306 732 trading as Goldacres Agricultural Equipment (its successors and assigns) which is the seller of the Goods;
(2) "Purchaser" means the purchaser of the Goods;
(3) "Goods" means the product and, if any, the services sold or provided;
(4) Nothing in these warranty terms and conditions shall be read or applied so as to exclude, restrict or modify or have the effect of excluding, restricting or modifying, any condition, warranty, guarantee, right or remedy implied by law (including the Competition and Consumer Act 2010) and which by law cannot be excluded, restricted or modified.
(5) GST Act and GST are given the meanings referred to in a New Tax System (Goods and Services Tax) Act 1999.

General

2. (1) These warranty terms and conditions and the terms and conditions incorporated herein by virtue of clause 3 hereto (which shall only be waived in writing signed by Goldacres/Pathway) shall prevail over all other terms and conditions of the purchaser or otherwise to the extent of any inconsistency.
(2) This warranty may not be modified or added to without the expressed written consent endorsed hereon of the Managing Director of Goldacres Trading P/L.

Terms and conditions of sale and warranty.

3. The Goods and all other products sold and, if any, services sold or provided by Goldacres/Pathway are contained in these terms and conditions, and additional terms and conditions as described by the documents "Pathway Forklifts warranty terms and conditions" or "Pathway Pumps warranty terms and conditions." To the extent of any inconsistency between these terms and conditions and the additional terms and conditions described in the said documents, these terms and conditions shall prevail.

Goldacres quotations.

4. Unless previously withdrawn, Goldacres' quotations are open for acceptance within the period stated therein or, when no period is stated, with 14 days only of the quotation date. Goldacres reserves the right to refuse any order based on any quotation within 7 days of receipt of the order.

Packing

5. The cost of any special packing and packing materials used in relation to the Goods shall be at the purchaser's expense notwithstanding that such cost may have been omitted from any quotation.

Shortage

6. The purchaser waives any claim for shortage of any Goods delivered if a claim in respect thereof has not been lodged with Goldacres within (7) seven days from the date of receipt of the Goods by the purchaser.

Specifications, etc: Catalogues, etc: Quantities

7. All specifications, (without limiting the generality of same – including: drawings, particulars of weights, volumes, capacities, dimensions, load factors) are approximate only and any deviation shall not be taken to vitiate any contract with Goldacres/Pathway or form any claim against Goldacres/Pathway. The descriptions, illustrations, and performances contained in catalogues, price lists and other advertising matter do not form part of the contract of sale of the Goods. Where specifications, drawings or other particulars are supplied by Purchaser, Goldacres/Pathway' price is made on estimates of quantities required. Should there be any adjustments in quantities above or below the quantities estimated by Goldacres/Pathway and set out in a quotation, then any such increase or decrease shall be adjusted on a unit rate basis according to unit prices set out herein.

Performance, Capacities, Chemicals, Liquids, Application Methods, Environmental Effects

8. Any performance, volumes, and/or capacity figures given by Goldacres/Pathway are estimates only. Goldacres/Pathway shall be under no liability for damages for failure to obtain such figures unless specifically guaranteed in writing and any such written guarantee shall be subject to the recognised tolerances applicable to such figures. The suitability of chemicals and other liquids for any application and the application methods and the environmental effects shall be sole decision and responsibility of the purchaser and the user of the Goods. Goldacres/Pathway gives no warranty as to the suitability of any chemicals or other liquids for any application, nor the application methods nor the environmental effects, which may result from the use of the Goods. Goldacres/Pathway shall be under no liability for damages arising out of the use of any chemicals, liquids, or mixtures in the Goods nor for any application, nor for the application methods nor for the environmental effects, which may result from the use of the Goods.

Delivery/Service Times

9. The delivery times and service times made known to the purchaser are estimates only and Goldacres shall not be liable for late delivery, non-delivery or delay and under no circumstances shall Goldacres be liable for any loss, damage or delay occasioned by the purchaser or its customers arising from the late or non-delivery or late installation of the Goods.

Loss or damage in transit

10. Goldacres is not responsible for any loss or damage to Goods in transit. Goldacres shall render the purchaser such assistance as may be necessary to press claims on carriers provided that the purchaser shall have notified Goldacres and the carriers immediately the loss or damage is discovered on receipt of Goods and shall lodge a claim on the carrier within three days of the date of receipt of the Goods. Insurance of Goods in transit is the responsibility of the purchaser.

Limit of Liability

11. (1) Goldacres/Pathway liability for Goods manufactured by it is limited to:

1.1 where the law implies consumer guarantees into these terms and conditions pursuant to Part 3.2 Division 1 of Schedule 2 to the Competition and Consumer Act 2010 (C'th") ("consumer guarantees") which cannot be excluded and Goldacres/Pathway breaches a consumer guarantee, the loss and damage the purchaser is entitled to at law which cannot be excluded by these terms and conditions;
and, in all other cases

1.2 making good any defects by repairing the same or at Goldacres/Pathway option by replacement within a period not exceeding either 1000 hours or twelve calendar months, whichever comes first, after the Goods have been dispatched provided that:
(a) the defects have arisen solely from faulty materials or workmanship;
(b) the Goods have not received maltreatment inattention or interference;
(c) accessories of any kind used by the purchaser are manufactured or approved by Goldacres/Pathway;
(d) where applicable, the seals on the Goods remain unbroken;
(e) there has been no improper adjustment, calibration or operation;
(f) the use of accessories including consumables, hardware or software (not manufactured by Goldacres/Pathway) has been approved in writing by Goldacres/Pathway;
(g) no contamination or leakage has been caused or induced;
(h) any modification to the Goods have been authorised in writing by Goldacres/Pathway;
(i) there has been no inadequate or incorrect use, storage, handling or application of the Goods;
(j) there has been no use or operation of the Goods outside of the physical, electrical or environmental specifications of the Goods;
(k) there has been no inadequate or incorrect site preparations;
(l) there has been no inadequate or improper maintenance of the Goods;
(m) it has not been caused by fair wear and tear; and
(n) firstly the Goods have been thoroughly inspected and any damage (from whatever cause) to the Goods (and in particular – the structure, welding, seams, bolts, booms) has been repaired prior to the Goods being operated, used driven or moved and on each occasion the tanks are filled; and
(o) there has been no failure to comply with the requirements of all present or future laws or regulations relating to the Goods and/or the use and/or the operation of the Goods; and
(p) there has been no failure to maintain a record of hours of operation (which record shall contain full details of all inspections, repairs and maintenance) and produce same to Goldacres/Pathway at the time of the warranty claim;
(q) the defective Goods or any damaged part of the Goods are promptly returned free of cost to Goldacres/Pathway or a representative of Goldacres/Pathway;
(r) all warranty related repairs have been carried out with the prior authorisation of Goldacres/Pathway;
(2) If Goods or any part thereof are not manufactured by Goldacres/Pathway, in particular engines, engine accessories, transmissions, transfer cases, differentials, tyres, tubes, batteries, radios and UHFs, the guarantee of the manufacturer thereof shall be accepted by the purchaser and is the only guarantee given to the purchaser in respect of the Goods or that part provided always that this clause does not seek to exclude the consumer guarantees;
(3) in the case of hydraulic systems, Goldacres/Pathway shall replace defective parts in accordance with clause 11(1) of these conditions, provided that the failure of the part was not related to contamination within the system, Goldacres/Pathway shall not be liable for labour in the case of repairing hydraulic system defects;
(4) this warranty does not extend to components considered as normal wear items including, but not limited to nozzles, chains, belts, filters, brake pads, polyethylene bushes and liquid pump valves, valve O-rings, diaphragms and seals;
(5) Goldacres/Pathway shall not be liable for and the purchaser releases Goldacres/Pathway from any claims in respect of faulty or defective design of any Goods supplied unless such a design has been wholly prepared by Goldacres/Pathway and the responsibility for any claim has been specifically accepted by Goldacres/Pathway in writing and in any event Goldacres/Pathway liability hereunder shall be strictly limited to the replacement of defective parts in accordance with paragraph 11 (1) of these conditions provided always that this clause does not seek to exclude the consumer guarantees;
(6) except as provided herein, all express and implied warranties, guarantees and conditions under statute or general law as to the merchantability, description, quality, suitability or fitness of the Goods for any purpose or as to design, assembly, installation, materials or workmanship or otherwise are hereby expressly excluded and Goldacres/Pathway shall not be liable for physical or financial injury, loss or damage or for consequential loss or damage of any kind arising out of the supply, layout, assembly, installation or operation of the Goods or arising out of Goldacres/Pathway negligence or in any other way whatsoever;
(7) Warranty shall only be available to the Purchaser and shall not be transferable by the Purchaser;
(8) Warranty in no way extends to any used Goods.

12. Goldacres/Pathway liability for breach of a consumer guarantee is hereby limited (in the case of goods and services not used for personal, domestic or household purposes) to:
(1) in the case of Goods, any one or more of the following:
(a) the replacement of the Goods or the supply of equivalent Goods;
(b) the repair of the Goods;
(c) the payment of the cost of replacing the Goods or acquiring the equivalent Goods;
(d) the payment of having the Goods repaired; or
(2) in the case of services;
(a) the supplying of the services again; or
(b) the payment of the cost of having the services supplied again.

Prices

13. Already stated
(1) Unless otherwise stated in writing by Goldacres/Pathway, all prices quoted by Goldacres/Pathway are inclusive of GST for supplies within Australia and exclusive of GST for exports outside of Australia. Prices quoted are those ruling at the time of quotation or the date the price is given and are based on rates of freight, insurance, customs, duties, taxes, exchange, shipping expenses, sorting and stacking charges, cartage, cost of materials and other charges affecting the cost of production ruling on that date and any alterations thereto either before acceptance of or during currency of the contract shall be to the purchaser's account.
(2) For the purpose of 38-185 of the GST Act, the day upon which the seller gives the invoice for the supply shall be the date of the invoice.

Payment

14. Already stated
(1) The purchase price in relation to the Goods and the cost of the service shall be payable without deduction and or set off and payment thereof shall be made on or before the thirteenth day of the month following the delivery of the Goods or performance of the services unless other terms of payment are expressly stated in writing.
(2) A decreasing or increasing adjustment and or the issuing of an adjustment note, pursuant to Division 21 and Division 29-C of the GST Act, shall not, in any way, constitute a release, waiver, and or forgiveness of the debt incurred by the purchaser.

Interest on overdue payments

15. If Goldacres is not paid for any goods or services on the due date specified in this agreement without prejudice to any other right or remedy, all outstanding money shall bear interest at the rate set, pursuant to the Penalty Interest Rates Act, Victoria, 1986, as such money, together with interest shall be recoverable forthwith from the purchaser.

Rights in relation to Goods.

16. Goldacres/Pathway reserves the following rights in relation to the Goods until all accounts owed by the purchaser to Goldacres are fully paid.
(1) Legal ownership of the Goods
(2) To enter the purchasers premises (or the premises of any associated company or agent where the Goods are located) without liability for trespass or any resulting damage and retake possession of the Goods; and
(3) To keep or resell any Goods pursuant to (2) above;
If the Goods are resold, or products manufactured using the Goods are sold, by the purchaser, the purchaser shall hold such part of the proceeds of any such sale as represents the invoice price of the Goods sold or used in the manufacture of the Goods sold on a separate and identifiable account as the beneficial property of Goldacres and shall pay such amount to Goldacres on request. Notwithstanding the provisions above Goldacres shall be entitled to maintain an action against the purchaser for the purchase price and the risk of the Goods shall pass to the purchaser upon delivery.

Purchasers property

17. Any property of the purchaser under Goldacres' custody or control shall be entirely at the purchaser's risk as regards loss or damage caused to the property or by it.

Storage

18. Goldacres reserves the right to make a reasonable charge for storage if delivery instructions are not provided by the purchaser within (14) fourteen days of a request by Goldacres for such information.

Returned Goods

19. Goldacres shall not be under any obligation to accept Goods returned by the purchaser and will do so only on terms to be agreed in writing in each individual case.

Goods sold

20. All Goods to be supplied by Goldacres shall be described on the purchase order agreed by Goldacres and purchaser and the description on such purchase order modified as so agreed shall prevail over other descriptions including any purchaser's specification or enquiry.

Cancellation

21. No order may be cancelled except with the consent in writing and on terms, which will indemnify Goldacres against all losses.

No waiver

22. The failure of any party to enforce the provisions of this agreement or to exercise any rights expressed in this agreement shall not be a waiver of such provisions or rights and shall not affect the enforcement of this agreement. The exercise by any party of any of its rights expressed in this agreement shall not preclude or prejudice such party from exercising the same or any other rights it may have irrespective of any previous action taken by that party.

Force Majeure

23. If by reason of any fact, circumstance, matter or thing beyond the reasonable control of Goldacres is unable to perform in whole or in part any obligation under this agreement then Goldacres shall be relieved of that obligation under this agreement to the extent and for the period that it is so unable to perform and shall not be liable to the purchaser in respect of such inability.

Passing of risk

24. Risk in the Goods shall pass to the purchaser upon delivery of the Goods to the purchaser or collection of the goods by the purchaser's agent or carrier as the case may be.

Exclusion of liability

25. To the extent permitted by law Goldacres/Pathway shall not be liable to the purchaser in contract or in tort arising out of, or in connection with, or relating to, the performance of the Goods or any breach of these conditions or any fact, matter or thing relating to the Goods or error (whether or not it is negligent or a breach of contract) in information supplied to the purchaser or a user before or after the date of the purchaser's or user's use of the Goods and Goldacres/Pathway shall be under no liability for damages arising out of the use of any chemicals, liquids, or mixtures in the Goods, nor for any application, not for the application methods nor for the environmental effects, which may result therefrom or from the use of the Goods.

Exclusion of representations and arrangements

26. To the extent permitted by law the terms and conditions supersede and exclude all prior and other discussions, representations (contractual or otherwise) and arrangements relating to the supply of the Goods or any part thereof including, but without limiting the generality of the foregoing, those relating to the performance of the Goods or any part thereof or the results that ought to be expected from using the Goods.

Place of contract

27. The contract for sale of the Goods and the provision of the services is made in the State of Victoria and the purchaser agrees to submit all disputes arising with Goldacres to the courts of such State and any court competent to hear appeals therefrom.

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Chapter 2

SAFETY

General

The following pages outline important safety information. At Goldacres safety is a high priority. These safety and warning instructions MUST be followed to ensure the safe operation of your Goldacres equipment.

Explanation of key terms used in this operator's manual are:

Danger

You will be killed or seriously hurt if you don't follow instructions

Warning

You can be seriously hurt if you don't follow instructions

Caution

You can be hurt if you don't follow instructions

Note

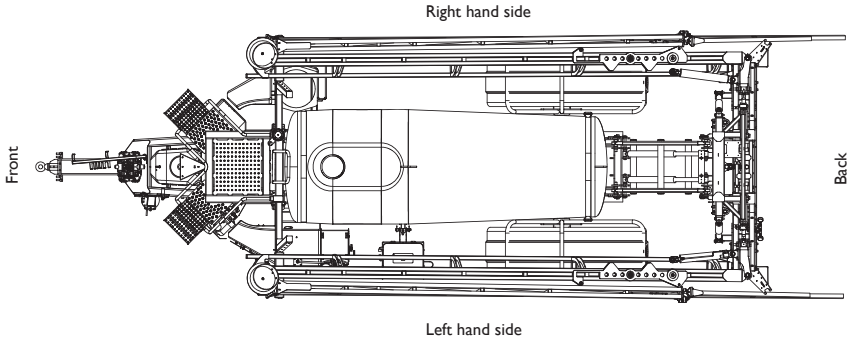
Is used to notify people of installation, operation or maintenance information that is important but not hazard related.

The Operator

All operators of this equipment should be adequately trained in the safe operation of this equipment. It is important that all operator's have read and fully understand the operators manual prior to using this equipment.

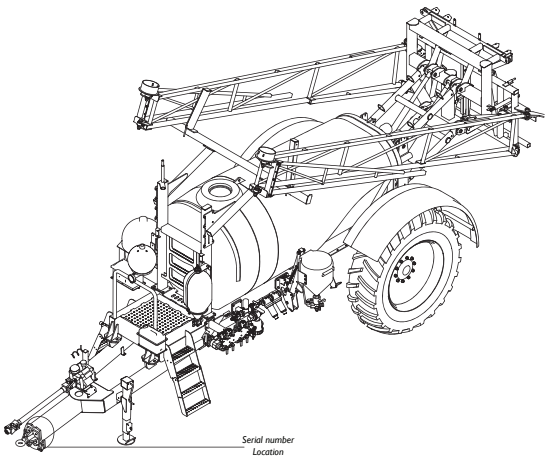
All new operators should be trained in an area without bystanders or obstructions and become familiar with the sprayer prior to operation.

Machine Orientation



Identification

When ordering parts or requesting service information for your sprayer it is important to quote the serial number of your machine, and the purchase date, in order to receive accurate information. The location of the serial number plate on your machine is shown in the picture.



Safety Precautions

Notes

- Always read, and understand, the operator's manual prior to operation of this equipment.
- It is the responsibility of the operator to ensure that there are no decals missing from the equipment and that any damaged, or missing, decals are replaced prior to operation.
- Goldacres equipment ordered, or operated, outside the guideline limitations may not be warranted by Goldacres for successful performance. Operators working outside these limitations do so at their own risk, unless specific advice has been sought from, and provided by, Goldacres in writing.
- Always read and follow the chemical manufacturer's guidelines for safe application as per the chemical label. Particular attention should be given to the recommended target application rate of the chemical being applied as per the chemical label.
- Inspect the equipment thoroughly for damage and wear before operation.
- Lubricate the equipment as per recommended requirements before operating.
- Flush chemicals from equipment immediately after use.
- Certain chemicals may be unsuitable for use with Goldacres standard plumbing designs. Consult your Goldacres dealer if in doubt.
- Do not operate the equipment while under the influence of any drugs, alcohol or if excessively tired.
- Make sure that the equipment complies with all relevant road regulations when transporting.
- Goldacres equipment uses several materials that may be harmful to the environment. Potentially harmful waste used with Goldacres equipment includes such items as oil, fuel, coolant, brake fluid and batteries. If these items are disposed of incorrectly the waste can threaten the surrounding environment and ecology. The waste products can leech into surrounding water sources and contaminate the area.
- When draining fluids from the equipment use appropriate, leak proof containers. Do not use food or beverage containers because someone may consume the contents by mistake.

Warnings

- Any unauthorised modifications to this equipment may affect its function and create a serious safety risk.
- Keep clear of overhead obstructions – especially powerlines as contact can be fatal.
- Never attempt to clean parts, or nozzles, by blowing with mouth.
- Never attempt to siphon chemicals, or substances, by sucking.
- It is imperative that the vehicle manufacturer's specifications be checked and all instructions for use when transporting, or towing, be adhered to at all times.
- Care should be taken when transferring liquid into the tank to ensure that the gross weight of the equipment does not exceed the carrying, braking and/or towing capacity of the vehicle to which the equipment is attached as specified by the vehicle manufacturer.

NOTE: 1 LITRE WATER = 1 KG.

- Water weighs 1kg per litre, however conversion factors must be used when spraying liquids that are heavier or lighter than water. Example: liquid nitrogen has a density of 1.28 kg/L and will therefore be significantly heavier than water if the tank is filled completely.
- Suitable care should be taken when driving with the equipment attached to the vehicle. Consideration should be given to both the carrying capacity of the vehicle and the gradient of the terrain when determining the speed at which the vehicle can be driven safely.
- Ensure that the maximum speed of the vehicle, when loaded, is within the vehicle manufacturer's limitations.
- Ensure equipment is securely fastened, or attached, to vehicle at all times.
- Where equipment is fitted to a tractor, ensure tractor linkage arms are secure and do not sway.
- Never stand within the radius of boom wings.
- Never work under any hydraulically raised boom.

ENTANGLEMENT IN ROTATING DRIVE LINES

Rotating drives can cause serious injury or even death when entanglement occurs. Keep hands, feet, hair and clothing away from all moving parts to prevent injury. Never operate this machine with covers, shrouds, or guards removed.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Always wear close fitting clothing and safety equipment designed for the job.

- Exposure to loud noise over an extended period can cause impairment or loss of hearing. Be active in the conservation of your hearing and wear appropriate hearing protection at all times.
- Chemicals can be harmful to humans, appropriate PPE should be used when handling chemicals. Always refer to the chemical manufacturers label for guidelines on the appropriate PPE to use with the chemical/s you are using.

Goldacres also suggest that you read and understand the following Australian standards:

- Australian Standard for Chemical protective clothing AS3765
- Australian Standard for Respiratory protection devices AS1715

AIR BORNE PARTICLES

- Always stand well clear of equipment during operation.
- Any spray drift is dangerous and may be hazardous to humans.
- When heating and welding components, ensure that all paint and other such materials are removed. Often hazardous air borne particles and fumes are generated from welding and heating.

DO NOT HEAT PRESSURIZED FLUID LINES

When conducting any process on the machine that involves heat; be aware of pressurized fluid lines in the vicinity of your work area.

Warnings *(continued)*

Pressurized lines can be easily cut when the heat over shoots the target object.

DO NOT CARRY PASSENGERS

Do not stand or carry passengers on the steps or platform when the equipment is in motion or when the booms are being folded or unfolded.

FLUIDS UNDER PRESSURE

Fluids escaping from high pressure lines can cause serious injury to skin. Hydraulic oil can easily penetrate human skin. This hazard can be avoided by relieving the pressure in the system.

Do not disconnect any hoses, nozzles or filters while equipment is operating. Disconnecting these components while under pressure may result in uncontrolled fluid discharge which may be hazardous.

When the repair is complete ensure that all fittings and lines are secured before re-applying pressure.

Cautions

- A supply of fresh water should be with the equipment at all times.
- Tanks are not designed for use with diesel fuel or any flammable liquid.
- Do not use this machine in ambient temperatures exceeding 40 degrees Celsius.
- Each individual boom section has a maximum delivery of 35 litres per minute with clean filters fitted.
- The maximum combined flow of all boom sections is limited to 140 litres per minute, or 50% of the pump flow whichever is the lesser amount, with clean filters.
- Do not exceed the maximum spraying pressure of 8 Bar.
- Ensure that all bolts are tightened and secured before operation.
- Where fitted, care should be taken to never overfill the diaphragm pump with oil or operate at speeds exceeding 540 rpm.
- Always ensure that the boom is securely supported when travelling.

Safe use of chemicals

The safe use of AgVet chemicals with this equipment is the responsibility of the owner/operators. All operators should be trained in the safe use of AgVet chemicals. Goldacres suggest that a relevant ChemCert course is completed by owners/ operators prior to operation of this equipment as a spray unit.

ChemCert Course Overview:

The ChemCert course is aimed at providing the level of training needed by producers to make sure that they understand the requirements to use agricultural and veterinary chemicals safely and effectively.

The course also encourages people to think about using alternatives to chemicals in their production systems by taking a risk management approach.

The ChemCert course has become the industry standard for AgVet chemical training. Satisfactory completion of the ChemCert AgVet Chemical Users Course results in ChemCert registration and the award by the training provider of a Statement of Attainment for two nationally recognised competency standards:

RTC 3704A - Prepare and apply chemicals

RTC 3705A - Transport, handle and store chemicals.

The ChemCert course is generally delivered by trainers over two days, plus additional assessment activities.

Further information on ChemCert courses can be supplied by the ChemCert organisation in your state:

Victoria:
www.chemcertvic.org.au
Ph: 03 5622 2055

South Australia:
www.chemcertsa.com.au
Ph: (08) 8842 4048

Queensland:
www.chemcertqld.org.au
Ph: (07) 5466 5850

Western Australia:
www.chemcertwa.com.au
Ph: (08) 9341 5325

New South Wales:
www.chemcert.com.au
Ph: (02) 9387 4714

Personal Protective Equipment (PPE)

Always wear close fitting clothing and safety equipment designed for the job.

Chemicals can be harmful to humans, appropriate PPE should be used when handling chemicals. Always refer to the chemical manufacturers label for guidelines on the appropriate PPE to use with the chemicals you are using.

Goldacres also suggest that you read and understand the following Australian standards:

- Australian Standard for Chemical protective clothing AS3765
- Australian Standard for Respiratory protection devices AS1715

Air borne particles

Always stand well clear of equipment during operation. Any spray drift is dangerous and may be hazardous to humans and animals.

Fluids under pressure

Do not disconnect any hoses, nozzles or filters while equipment is operating. Disconnecting these components while under pressure may result in uncontrolled fluid discharge which may be hazardous.

When the repair is complete ensure that all fittings and lines are secured before re-applying pressure.

Safety Decals

Understanding safety decals and their purpose assists in the safe operation of your sprayer. Safety decals are there for your protection and it is the responsibility of the owner operator to replace damaged and/or missing safety decals.

Regularly review safety decals with operators. It is very important to ensure that all new machine components and replacement parts include current hazard identification decals.

Replacement safety decals can be ordered from your Goldacres dealer or directly from Goldacres. Part numbers and descriptions of the decals on this machine can be found in the parts manual supplied.

Parts Ordering

When ordering parts from your Goldacres dealer, please quote:

- Serial No.
- Part No. required
- Part Description
- Quantity Required

The parts manual supplied with this machine includes all the relevant information that you need when ordering parts from your dealer or Goldacres. When returning parts to Goldacres, or to a Goldacres dealer, for service or repair all parts MUST be cleaned thoroughly before sending them. Goldacres cannot expose technicians to the many potentially hazardous pesticides and substances that are in use.

NOTE: Please ensure that all parts are clearly labelled with the owner's details, and a brief description of the fault. Goldacres are not liable for the return of any goods to Goldacres or a Goldacres Dealer. The goods must be returned to the point of sale. The customer will be responsible for any cost incurred by a Goldacres appointed person travelling to any site outside the point of sale.

Genuine Goldacres parts only should be used on Goldacres equipment.

Chapter 3

GENERAL INFORMATION & SPECS

General

Chassis:
The chassis is an all steel construction, that is fully welded for superior strength. The chassis is shot blasted, primed and then protected by the Goldacres paint process for excellent chemical resistance and durability.

Paint Colours:

Wheels:	N23 Neutral Grey
Steel work:	G13 Dark Green

Tank:
All tanks are constructed from UV resistant polyethylene. Polyethylene tanks have a very high chemical resistance. Due to the rotomoulding process, there can be a variance in the overall dimensions of the tank which in turn results in variations to the tank capacity. For this reason, calibration markings should be used as a guide only.

Agitation:
The Supermix agitator is located at the back of the tank and is used to generate increased agitation within the tank. The pressure line to the Supermix agitator from the control manifold passes through a nozzle and then through the barrel into the tank. This causes extra agitation as flow around the agitator is sucked into the barrel and is then passed back into the tank. To increase this venturi effect, the bypass flow from the electric regulating valve also passes through the barrel, multiplying the agitation effect. The supermix agitator has an approximate capacity of 300 - 1300 l/min depending of the pump size and operating pressure. For further information refer to the "maintenance" chapter.

Boom Valves:
Motorised boom valves, for control of boom section on/off, are fitted as standard. These are mounted on the boom centre section at the rear of the sprayer. The number fitted is dependent on on the number of boom sections and number of boom lines.

Controller:
Special Evolution sprayers are supplied standard with a Raven SCS450 automatic rate controller. Automatic rate controllers will maintain a user defined application rate automatically as the towing vehicle speed changes. In order to function, the automatic rate controller relies on a flow meter, speed sensor and control valve. For specific information on the Raven controller please refer to Raven operator's manual supplied and "calibration" section of this manual.

Filtration:
Filtration is a critical part of the sprayer's performance.

As standard Special Evolution sprayers are fitted with:
1 x Suction filter (30 mesh)
2 x Pressure filters (1x80 & 1x100 mesh)
Nozzle strainers (50 mesh)

Pump:
Udor, positive displacement, oil backed diaphragm pumps are fitted as standard on Goldacres equipment. The normal operating range is from 1 - 8 bar which is sufficient for efficient nozzle performance. A PTO drive is standard and a hydraulic drive is optional.

Chemical Induction:
The method of chemical induction into your sprayer is dependent on the optional chemical induction equipment fitted to your sprayer.

Goldacres chemical induction equipment available includes:
- Chemical probe
- Chemical induction hopper
- Transcal volumetric measuring device

Booms:
Goldacres booms are available in a variety of sizes up to 36 metres in width. Delta booms up to 24 metres and Tri Tech booms up to 30 metres can be fitted to the Special Evolution range - these booms feature hydraulic lift and fold, with control from the cabin of your tractor. Individual wing tilt is available as an option.

All booms feature: pitch, roll and yaw suspension in order to provide a superior boom ride and assist in the efficient application of chemical to your target.

Nozzles:
As information regarding nozzles is specific to those being used in your application, no specific reference is made to nozzle application rates or nozzle types in this operator's manual. Goldacres suggest the use of a current TeeJet nozzle selection catalogue for reference to nozzle sizes, outputs, spray patterns and general spraying information. For more technical information on the function of spray nozzles and factors affecting their performance you can also use the TeeJet "User's guide to spray nozzles".

The TeeJet nozzle selection catalogue and Users guide to spray nozzles are available from your Goldacres dealer, Goldacres, or as a free download from the TeeJet website: www.teejet.com

Machine Limitations:
All Goldacres equipment is subject to operating limitations, it is the operator's responsibility to ensure that this equipment is being operated within these limitations and appropriately to the operating conditions at hand.

Goldacres do not endorse use of this machine for spraying at speeds greater than 20 km/hr and should not be used in ambient temperatures exceeding 40 degrees celsius.

Each indivual boom section has a maximum delivery of 35 litres per minute with clean filters fitted. With clean filters fitted, the maximum combined flow of all boom sections is limited to 140 litres per minute, or 50% of the pump flow, whichever is the lesser amount.

Custom built equipment:
Where the owner of this sprayer has requested that custom built equipment or options be fitted to this sprayer it is necessary to understand that custom fabrication and engineering is subject to many variables. Goldacres cannot fully field test all custom built options prior to despatch, and owners of new sprayers fitted with custom built equipment or options need to understand that the functionality of these items may require refining in order to operate as desired.

Wheels and tyres

All tyres used on Goldacres sprayers have been designed to carry the maximum loaded weight of the sprayer when travelling at 20 km/h. The load capacity of the tyres decreases as travelling speed increases so it is important to heed this travelling speed limit.

The tyre pressure also needs to be checked regularly (check every 8 to 12 hours of operation) and maintained at the required tyre pressure.

There are many factors concerning the appropriate tyre pressure for a particular tyre and load. For example, the tyre size, rim type, tyre status (driven or free rolling), load, speed, haul length and ply rating all need to be considered when determining the tyre pressure.

The rated pressure and capacity, shown in the chart below, is applicable when the machine is stationary. The cyclic loading pressure & km/hr is applicable for machines that are loaded and moving.

To determine the correct tyre pressure:

- Determine the maximum weight of the sprayer when loaded (do not forget to add the weight of the any other tanks on the sprayer when filled).
- Allow for each tyre to carry half the maximum loaded weight of the sprayer (this does not allow for any load on the tractor pull or cyclical loading, which provides for a safety margin).
- Determine what tyre size and ply is on the sprayer.
- Determine what appropriate tyre pressure will provide the load capacity required by the respective tyre as indicated in the following table.

For further information on wheels & tyres please refer to the "maintenance" chapter.

Tyre Size	Ply	Rated Pressure (KPa)	Rated Capacity (Kg)	Cyclic Loading Pressure (KPa)	10km/hr	20km/hr	30km/hr	40km/hr
					(Rated tyre capacity Kg when the sprayer is moving)			
14.9x24	8	180	1600	234	2992	2080	1840	1728
16.9x34	10	200	2360	260	4413	3068	2714	2549
18.4x38	16	240	4400	322	8228	5720	5060	4752

Hydraulics

Special Evolution sprayers can be set up for use on closed centre and open centre hydraulic systems. It is important that you are familar with the operating system of your tractor prior to connecting your sprayer.

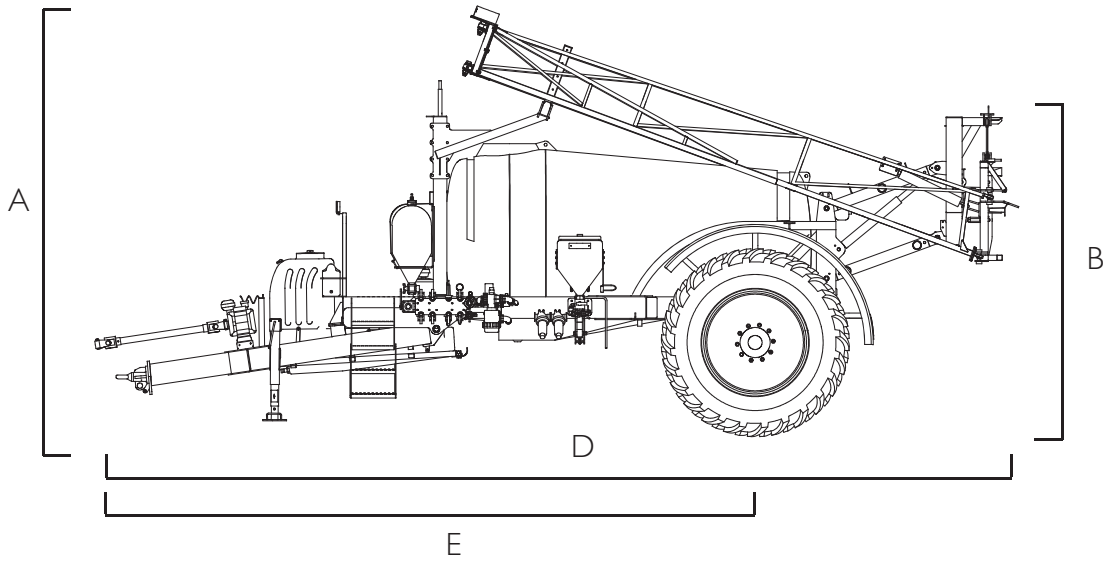
Further information on your specific system should be supplied by your dealer if required.

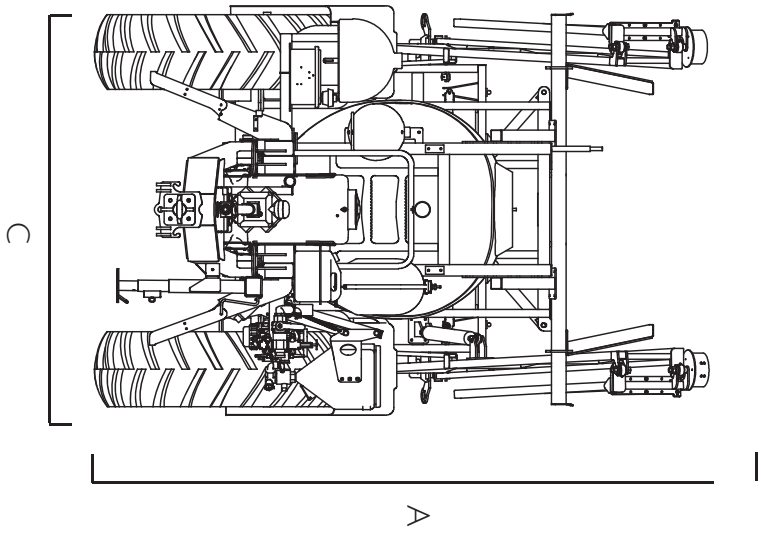
Dimensions

The following information is provided as a guide only.

Variations in weights and dimensions may occur without notification. To ensure that the weights and dimensions are accurate for your sprayer it is recommended that you measure and weigh your sprayer individually.

Model	Boom size	Weight	A Front Height	B Rear Height	C Width	D Total Length	E Wheelbase
4024	24m		2800	3150	2550	8350	5950
4028	28m		3900	3150	2550	8550	5950
4030	30m		3900	3150	2550	9250	5950
5024	24m		2800	3150	2550	8350	5950
5028	28m		3900	3150	2550	8550	5950
5030	30m		3900	3150	2550	9250	5950





Chapter 4

PRE-OPERATION

Drawbar connections

The standard drawbar connections are as shown in the pictures below. It is important that the dielectric grease (supplied with each sprayer) is applied to electrical connections prior to connection. This assists with lubrication and prevention of corrosion on these connections.

Raven SCS440/450 male & female connectors

Tail light connection

Raven male and female speed sensor connections

Hydraulic hose connections

Safety chains

Connecting to the tractor

Prior to connecting your tractor to the sprayer, it is important that the operator has read and fully understands this operator's manual.

Step 1: Ensure that the tractor is suitably rated to safely tow the sprayer and that the drawbar pin size matches the hitch on the sprayer. The standard hole size is 50mm.

Step 2: With the sprayer parked on a level surface, use the sprayer jack to raise the sprayer hitch in line with the tractor hitch.

Step 3: Reverse the tractor into sprayer hitch until aligned, and insert drawbar pin (not supplied). Then connect safety chains.

Step 4: With the sprayer securely attached to the tractor, raise the jack until weight is transferrred to the tractor. Then raise the jack and store in transport position.

Step 5: Fit the PTO shaft (if applicable).

- Grease the PTO shaft as per the lubrication schedule
- Fit the sprayer ensuring that the locking pin is correctly engaged
- Ensure that all safety guards and chains are in place

It is important that the instructions "fitting the PTO shaft" are followed for first time PTO shaft setup.

NOTE: The wide angle joint must be connected to the tractor PTO shaft.

For hydraulic drive pumps - connect hydraulic hoses to tractor remote outlets. (Refer to "general info & specs" chapter for important hydraulic information.)

Step 6: Fit the spray controller and any other switch boxes supplied in tractor cabin. Make sure that all controllers and switch boxes are securely mounted.

Step 7: Connect any power leads from controller or switch boxes directly to battery.

Step 8: Connect drawbar connections (hydraulic hoses, wiring loom, speed sensor cable, tail light plug and any other connections) between the tractor and the sprayer.

Disconnection of the sprayer from the tractor is the reverse of the above instructions.

Hydraulic drive pumps

Diaphragm pumps can also be driven by a hydraulic motor which is bolted directly to the front of the pump.

The oil line to the hydraulic pump is fitted with a needle valve that regulates oil flow to the pump. Many tractors feature hydraulic oil flow regulation in the cabin, however this needle valve can be used to control the flow on tractors that are not fitted with hydraulic oil flow regulation.

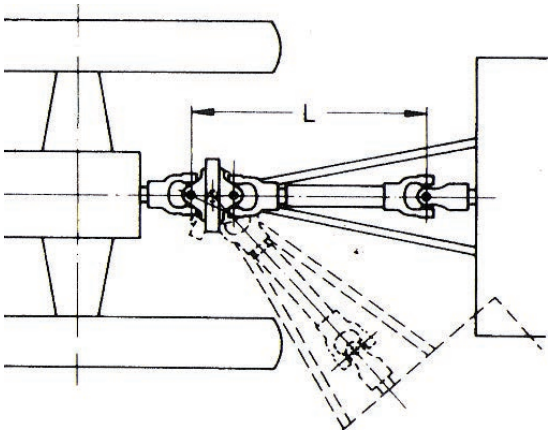
Where the tractor has the capability to regulate flow from the cabin, it is recommended to close the needle valve and adjust the hydraulic oil flow from the tractor to set the pump running at 400 - 540 rpm.

Hydraulic drive pump

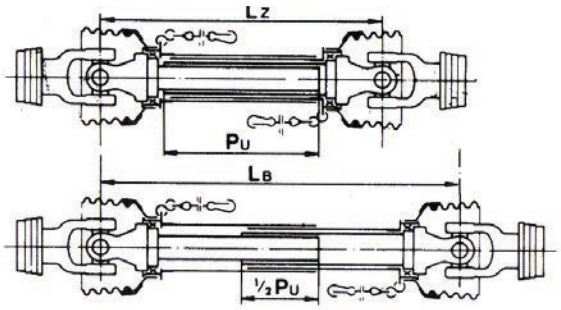
Hydraulic drive - needle valve

Fitting the PTO shaft

Wide angle PTO shafts are fitted as standard to Prairie Evolution sprayers. When using/hitching a sprayer (especially for the first time) the following critical points concerning the PTO shaft must be considered:



Maximum PTO operating length
Try to obtain the greatest possible overlap. In its working position, the PTO shaft must not be extended by more than half the profile overlap (Pu) available when fully compressed (Lz). The maximum PTO operating length is shown on the diagram below as Lb)



PTO shaft length adjustment
To adjust the length:

1. Hold the shafts next to each other in the shortest working position and mark them.
2. Shorten the inner and outer guard tubes equally.
3. Shorten inner and outer sliding profiles by the same length as the guard tubes.
4. Round off all sharp edges and remove burrs.
5. Grease sliding profiles before reassembling.

NOTE: It is important that enough "travel" is allowed in the PTO shaft to ensure that it does not collapse fully when travelling through a ditch etc and cause damage to the pump.

Maximum PTO joint operation
Ensure equal joint angles. For wide angle PTO shafts the following are guidelines for operation:

Continuous operation - 25 degrees
Short duration - 80 degrees
Stationary - 80 degrees

Coupling the PTO shaft
Press in the locking pin and simultaneously push PTO shaft onto pump or tractor PTO shaft until pin engages. Pull PTO shaft back to make sure pin has engaged and the shaft cannot come off.

Chains
Chains must be fitted so as to allow sufficient articulation of the shaft in all working positions.

NOTE: The PTO shaft must not be suspended from the chain.

Mounting the consoles

The mounting of the consoles within the cabin of your tractor is a critical part of the set up process. It is important that the consoles are mounted in the cabin in such a way that it cannot cause harm to the operator under any circumstance while also being mounted in a user friendly way.

When the sprayer is removed from the tractor, and the consoles are to remain fitted, please ensure that all console's remain firmly mounted and cannot become a projectile.

For specific information on mounting the consoles, please refer to the Raven installation and service manual supplied.

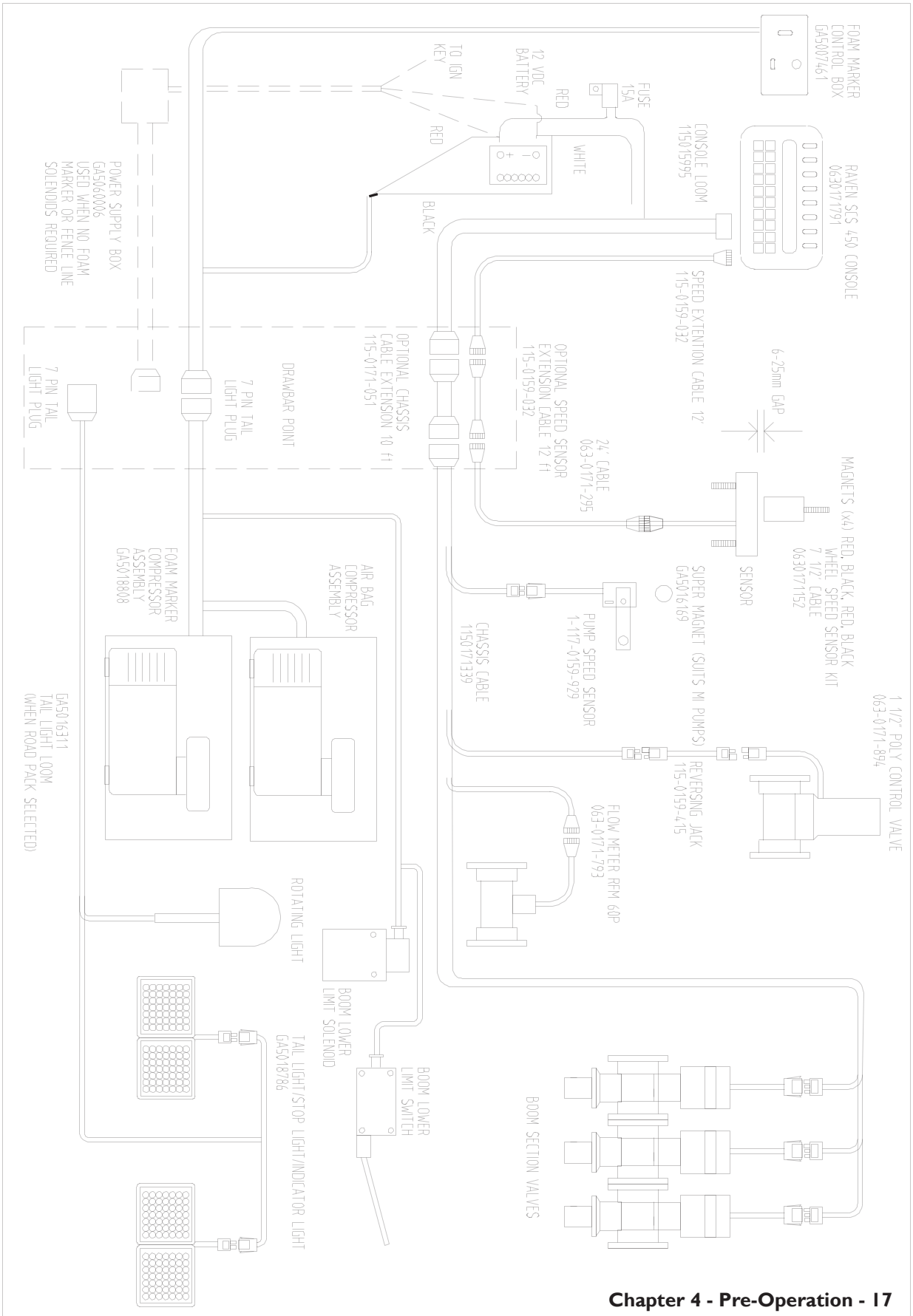
Connecting the consoles

The consoles should be connected as per the electrical schematics following. These schematics provide you with a layout of all connections to ensure that the system is properly connected prior to operation.

To connect to the battery:
With the consoles mounted in the cabin, turn the power switch to OFF and route the red (+) and white (-) battery wires to a 12v battery. Attach the white battery wire to a negative terminal and the red battery wire to a positive terminal.

NOTE: The negative should be connected last to prevent the chance of short

Raven SCS450 wiring schematic



Chapter 5

CALIBRATION

General

Spraying is a complex task, that is affected by many variables. It is the responsibility of the operator to be familar with spraying variables and to understand the spraying process prior to operation.

In general, the operator should know:

- The target application rate.
- The required operating (spray) pressure.
- The speed of travel.
- The desired droplet size.

To make the spray application as accurate as possible, it is critical that your spray equipment is regularly calibrated.

The Raven automatic controller is designed to improve the uniformity of spray applications. Raven controllers will monitor and control the determined application volume, but prior calculations will be required to ensure spraying pressures do not exceed operating parameters. (Refer to Teejet catalogue) The Raven system comprises a console, flowmeter, speed sensor and liquid flow control valve.

As the sprayer is moving, the console records ground speed and then calculates the amount of flow required to maintain the respective application rate at that speed. The console monitors the amount of flow being used via the flowmeter and then determines if the flow is correct for that speed. Flow adjustments are made by the control valve which varies the amount (volume) of by-pass and thus the volume being applied via the boom is controlled.

When the console is in the automatic mode, as the ground speed increases, the flow to the booms required to maintain the application volume will be increased. This will result in the pressure (as displayed on the gauge) increasing. Conversely, as the ground speed decreases, the required flow to the booms, as well as the pressure, decreases.

When the console is in the manual mode, as the ground speed increases, the pressure and flow will remain constant and the application volume will decrease. Similarly, as the ground speed decreases, again the pressure and flow will remain constant and the application rate will increase.

Record your console calibration information in the table below for future reference:

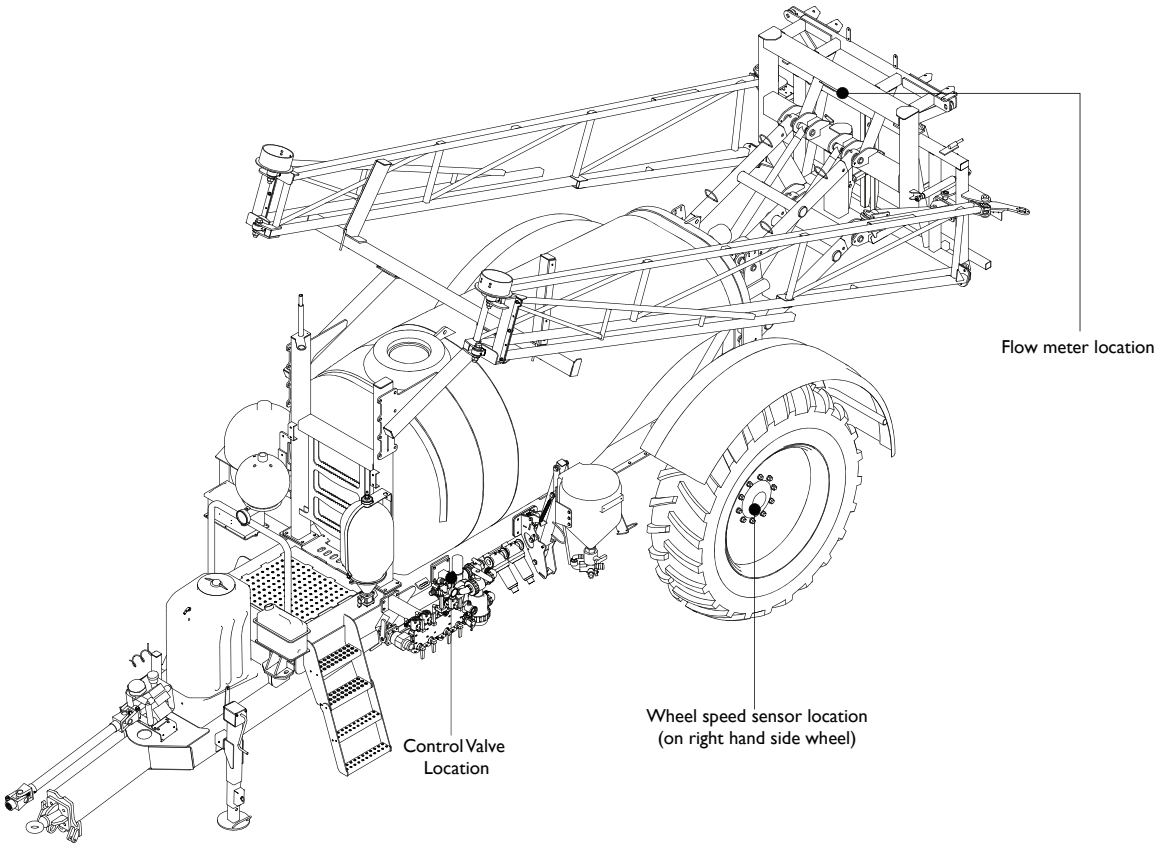
Boom 1 Cal	
Boom 2 Cal	
Boom 3 Cal	
Boom 4 Cal	
Boom 5 Cal	
Speed Cal	
Meter Cal	
Valve Cal	
Rate 1	
Rate 2	
Tier 1	
Tier 2	

$$\text{L/Min (per nozzle)} = \frac{\text{L/ha x km/hr x W}}{60{,}000}$$

$$\text{L/ha} = \frac{60000 \times \text{l/min (per nozzle)}}{\text{Km/hr x W (metres)}}$$

$$\text{Km/hr} = \frac{\text{Metres x 3.6}}{\text{Time (seconds)}}$$

Control valve, speed sensor & flow meter locations



Control valve

The control valve is located behind the EZ control fill and pressure manifold.

The control valve regulates the flow going to the boom sections directed via the console. It controls the flow to the boom by regulating the amount of liquid that bypasses back to tank.

Flowmeter

There is a flowmeter on the sprayer, with a calibration number attached to it on a white tag. The number that is applicable is the one in square brackets, i.e. [185]. Note this number down as this is the number that should be entered as the Meter Cal. number.

The flowmeter must be flushed with fresh water before the sprayer is left unused for an extended period of time. Also do not allow water to freeze in the flowmeter as this can damage the housing.

The Flowmeter should be checked at the start of every spraying season and periodically during the season. The simplest way to check the accuracy of the flowmeter is to fill the tank to a previously determined volume mark (usually top fill marking) and then empty the tank through the flowmeter (i.e. via a self-test). Compare the reading from the flowmeter with the previous known volume. If there is a relatively large discrepancy (i.e. more than 50 litres out of a 3000 litre tank), the flowmeter should be removed from the sprayer, disassembled and the condition of the turbine checked and cleaned (make sure it spins freely). The flowmeter should then be reassembled and replaced on the sprayer. Perform the volume check again and if there is still a

discrepancy, the Meter Cal No. can be changed.

i.e. If volume reads 3100 litres instead of 3000 litres and the original Meter Cal value is 185.

New Meter Cal value =

185 x 3100 / 3000 = 191

The flow meter is located at the rear of the sprayer, on the boom centre section, above the boom valves.

Speed sensors

Raven automatic rate controllers can utilise a speed reading from:

A wheel speed sensor
GPS receiver
Radar speed sensor

Wheel speed sensor:

The wheel speed sensor is fitted to the right hand side wheel of the sprayer and uses four magnets (2 north pole (red) and 2 south pole (black)) fitted onto the rims to measure speed.

A north and south magnet must pass the sensor before a pulse is counted. The sensor must be mounted between 12mm & 19mm from the face of the magnet to receive a reading. The magnets must pass directly through the centre of the sensor face.

The speed calibration figure on the console indicates a measurement of the circumference of the wheel as it rolls across the ground. The wheel speed sensor detects when the wheel completes one revolution and the console calculates the distance the wheel travels - therefore giving a km/hr reading.

If the ground speed display reading is incorrect the calibration and sensor condition must be checked (see the troubleshooting section)

GPS receiver

If a GPS unit is fitted, GPS ground speed can be obtained and used in place of the wheel speed sensor.

To receive a speed reading from the GPS unit a **pulsed niema** string must be connected to the speed cable of the console. The console must then be set up to accept GPS speed. This is called radar in the console calibration settings. When using GPS the console speed cal figure is 200 initially and then can be fine tuned from this figure. See "calibration" chapter for further information on console setup.

Radar speed sensor:

The console can also utlise a radar signal for ground speed reading.

A "T harness" can be fitted to the tractor radar harness to send a pulsed signal to the console speed harness. The console must be setup to receive speed as "Radar."

When using a radar the console speed cal figure is 200 initially and then can be fine tuned from this figure. See "calibration" chapter for further information on console setup.

SCS450 console calibration

The following information is applicable for the Raven SCS 450 consoles:

Initially displaying "SP 1" and "CAL"

STEP 1: Press [ENTER] to lock in "SP 1" (Wheel-Drive or Drive-Shaft Speed Sensor)

For Radar Speed Sensor, toggle to "SP 2" by pressing [CE] then [ENTER]

STEP 2: Press [ENTER] to lock in "C-SD" (Standard Valve)

NOTE: These 2 steps are very important because the system will appear to function properly but if the units are incorrect the quantities will be very inaccurate. If an error has been made whilst calibrating these 2 steps, turn the console off then turn back on again with [CE] pressed and all information will be cleared. To see what has been programmed, depress [SELF TEST] for about 5 seconds and the programmed information should be displayed (flashing and toggling)

STEP 3:

Press [BOOM CAL] then [ENTER]

Enter Boom Section 1 in Centimetres, Press [ENTER]

(For example 6m = 600 cm. Press [6] then [0] then [0])

The Raven 450 console has provisions for handling up to 5 boom sections. To measure the boom width for each boom section, count the number of nozzles in each section and multiply by the nozzle spacing. i.e. 12 nozzles in one section at 50 cm (½ metre) spacings = 12 x 0.5m = 6 metres.

STEP 4: Press [1] to select boom section 2 (b-02)
Key in Boom Section 2, then press [ENTER]

STEP 5: Insert remaining boom sections by using toggle [☐] & [☐] buttons [1] or [2] If a boom section is not needed, enter a "0" for the length.

STEP 6:

Press [SPEED CAL] then [ENTER]

Enter Speed Cal in Decimetres (1metre = 10 decimetres)

Press [ENTER] (eg 477)

Speed Cal is the distance measured by 10 revolutions of the Speed Sensor Wheel. This is best done with the tank half full of water (best simulates average between full and empty) and measured on ground that is typical to what will be encountered when spraying. Also note the tyre pressure when this procedure is performed. This tyre pressure needs to be maintained for the speed cal to be accurate. The speed cal should be checked at the start of every spraying season as the speed cal may need to be altered to compensate for tyre wear, etc.

NOTE: For 450 console with 4 wheel magnets (2 red and 2 black) - measure distance and multiply by 10 (to convert into decimetres)

For 450 console with 2 wheel magnets (1 red and 1 black) - measure distance and multiply by 10 (to convert into decimetres) then multiply by 2

STEP 7: Press [METER CAL] then [ENTER]
Enter Meter Cal for litres. Press [ENTER] (eg 185)
Meter Cal is the Calibration number on the Flow Meter white tag. The required number for litres is the number in square brackets.

STEP 8:
Press [VALVE CAL] then [ENTER]
Enter "2123"
Press [ENTER]

STEP 9:

Press [RATE 1] then [ENTER]
Enter Rate 1 (litres per hectare)
Press [ENTER] (eg 60)

STEP 10:

Press [RATE 2] then [ENTER]
Enter Rate 2 (litres per hectare)
Press [ENTER] (eg 75)

NOTE: Rate 2 can be the same as Rate 1 if only the one rate is to be used.

STEP 11: OPTIONAL
Press [VOL/TANK] then [ENTER]
Enter the Volume in Tank at start of spraying

Press [ENTER] (eg 3000)

STEP 12: OPTIONAL
Press [TIME] then [ENTER]
Enter the time of the day. Press [ENTER]
(eg 10:30)

STEP 13: (WHERE HYDRAULIC DRIVE IS FITTED TO SPRAYER PUMP)

Press [SPEED] and hold down for 5 seconds until speed value begins to flash. When the pump is fitted with hydraulic drive, the flashing 'speed' figure represents the pump's RPM.

TO ZERO INFORMATION WHEN ENTERING NEW FIELD

When entering a new field, the previous data in the console can be changed to zero so that the new data is current for that field only.

NOTE: Write down all necessary data before removing data from console memory

To zero out data in Area and Volume:

STEP 1: Write down the previous information for Area and Volume

STEP 2: Press Area or Volume (Total or Field for 450 consoles)

STEP 3: Press [ENTER]

STEP 4: Enter "0"

STEP 5: Press [ENTER]

The Area and Volume will now count from zero for the new field.

SELF-TEST SIMULATION

By simulating speed, the Raven controller can be tested without having to move. The Raven works in rate (i.e. litres per hectare) and a speed is required in order to calculate a rate. The self-test simulation provides the console with a simulated speed even though the sprayer is stationary and thus the console will be able to display a rate.

This self-test should be performed when first testing the system so that the operator can become familiar with the working system.

STEP 1: Press [SELF TEST] then [ENTER]
Enter speed (i.e. 12.0 for 12 km/h)
Press [ENTER]
Press [SPEED] to verify speed

The sprayer will now operate so that it can be tested. Switch the boom sections on and off to see that the system compensates and the applied rate returns to the required rate. The self-test will cancel when motion from the vehicle is detected by the speed sensor. For radar speed sensor, disconnect the speed cable going into the back of the console in order to do a self-test.

Jug test procedure

The method of carrying out the jug test is as follows:

NOTE: There may be a noticeable difference between pressure shown on main spray pressure gauge on sprayer and the gauge installed on the boom. This is due normal pressure loss through the circuit.

This is only one pressure gauge fitted to the sprayer, this is reading the return pressure.

You will need:

- A calibrated measuring container that can measure the medium in litres, in 10 ml increments. e.g. 0.45 Lt.
- A timing device showing seconds.
- A pressure gauge mounted at the nozzle tip to verify the system pressure being delivered at the nozzle. Pathway/Goldacres part numbers QJ4676-45-1/4-NYR & Q590-2-NY will mount a suitable gauge to the nozzle body bayonet fitting. (Not including gauge).

1. Check the plumbing system for kinked or obstructed hoses and repair or replace any hoses that restrict the normal flow of the liquid.
2. Start your sprayer

   a. For sprayers not fitted with an automatic rate controller, set the boom operating pressure to the pressure at which you expect to spray.

   b. For sprayers fitted with an automatic rate controller, initiate a 'self test' procedure and set the application rate and speed to the settings depicted in your "Rate Chart" at which you expect to spray.

3. Then place the jug under one of the nozzles, for 1 minute (exactly) and then record the volume of liquid collected.
4. Repeat the test over a representative sample of the jets in each boom section
5. Compare the volume collected from each nozzle to the stated volume in your rate chart. It should be no more than plus or minus 10% of the volume stated in your Nozzle Supplier's rate chart
6. In the event that any of your nozzles do not deliver the required volume, a further investigation is required which may include, but not be limited to:

a. Cleaning the nozzles, using the method recommended by the nozzle supplier.

b. Replacing the nozzles. (TeeJet advise that nozzles that flow greater than +10% of their stated volume are 'worn out' and should be replaced.)

c. Cleaning nozzle filters.

d. Replacing filters.

e. Replacing pump diaphragms.

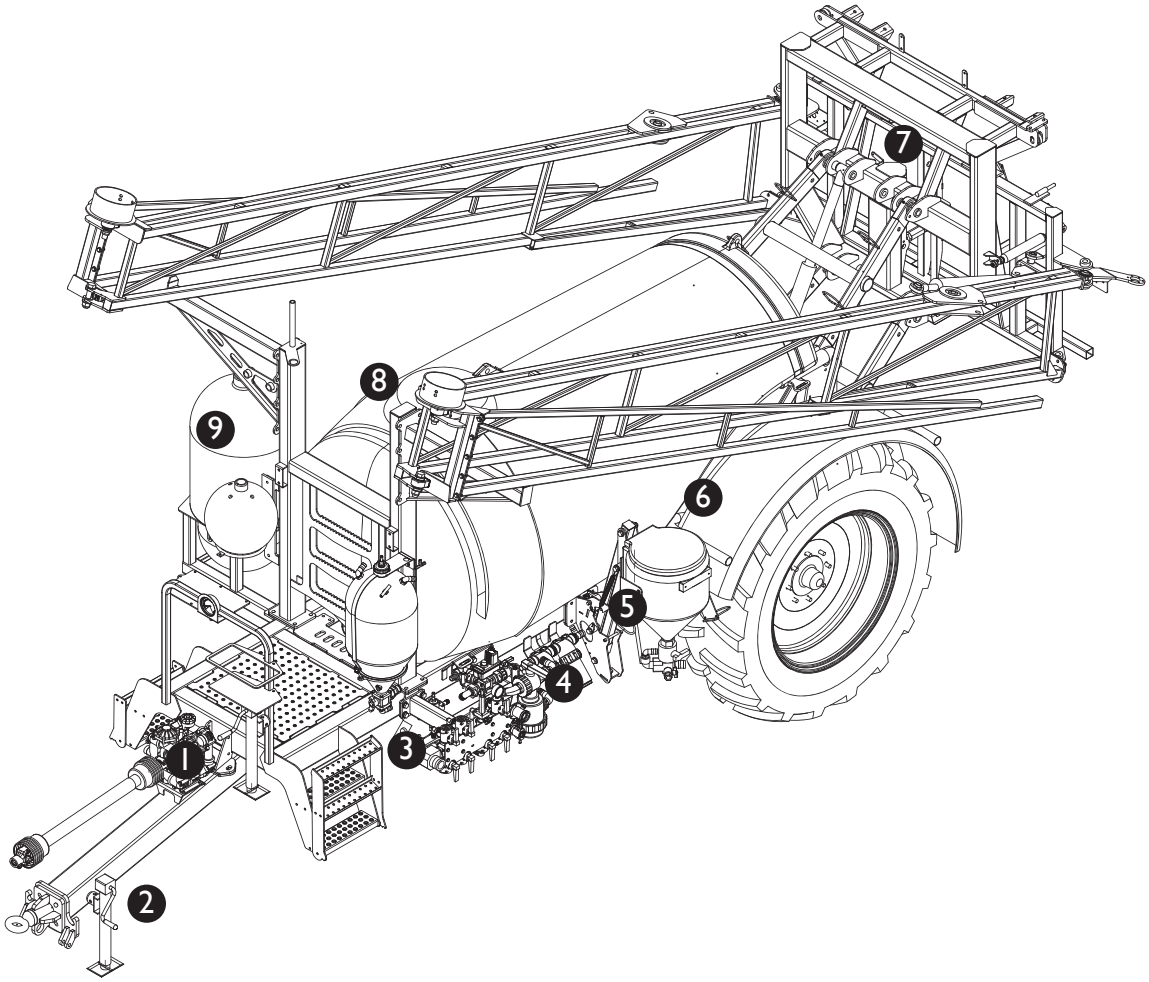
f. Replacing the pump.

g. Ensuring that the application rate required does not exceed the maxi mum flow and pressure parameters of the sprayer.

Chapter 6

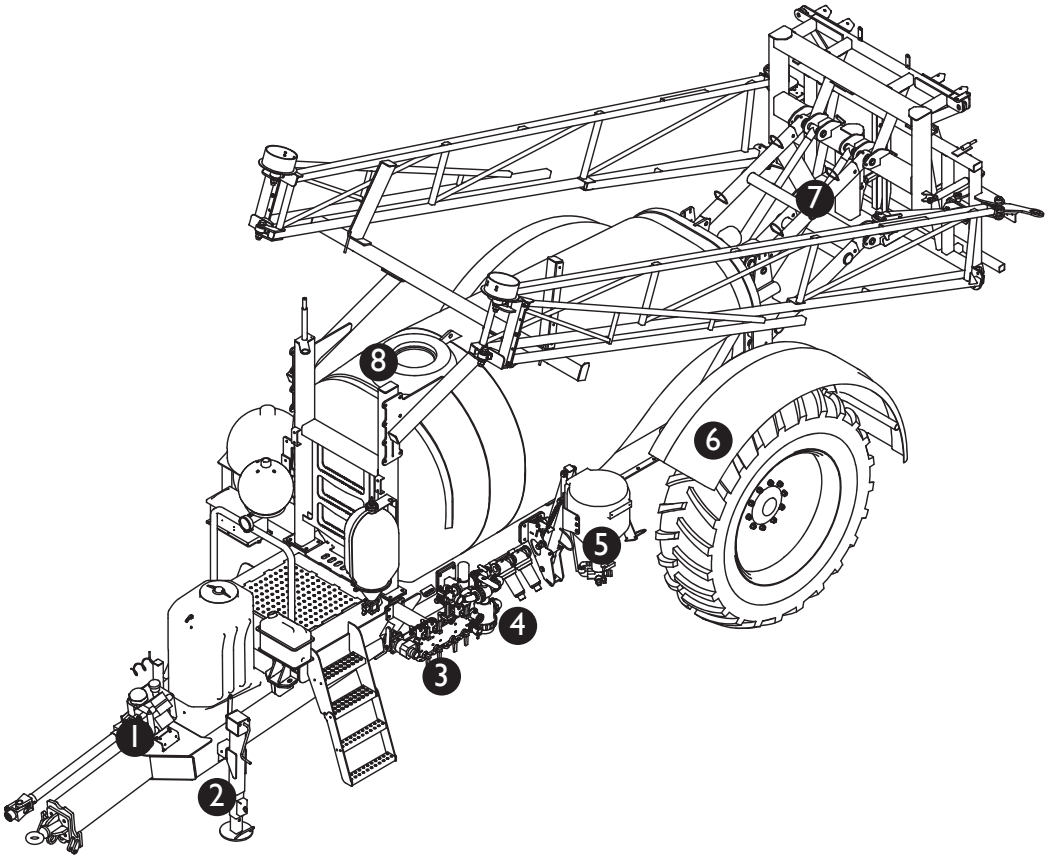
OPERATION

3000 litre key features



Number	Feature
1.	Diaphragm pump
2.	Jack
3.	EZ controll fill & pressure manifold
4.	Pressure filters
5.	Chemical induction hopper (option)
6.	Mudguards (option)
7.	Boom paralift
8.	Main tank lid
9.	Flush water tank

4000 & 5000 litre key features



Number	Feature
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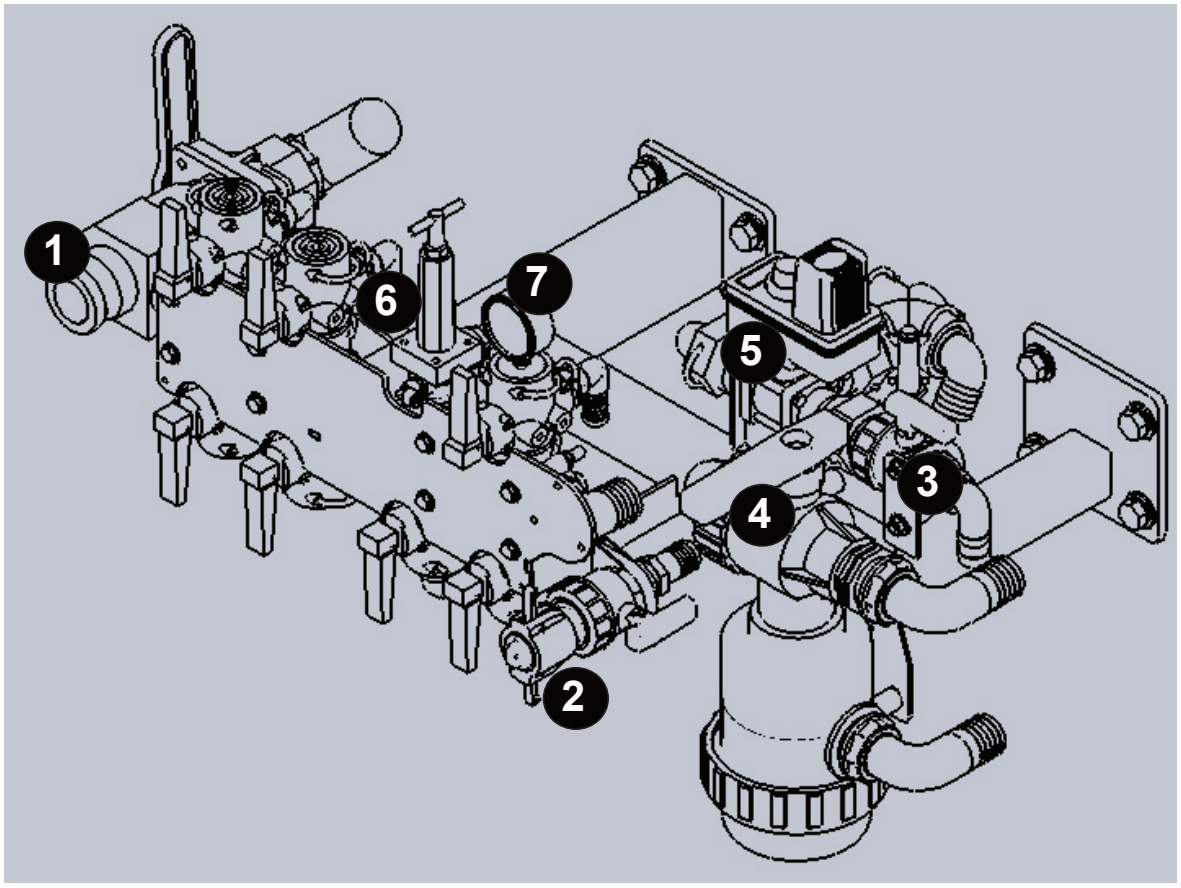
8.	Main tank lid

EZ Control


1
6
7
5
3
4
2


MAIN TANK RINSE NOZZLES
TRANSCAL RINSE
PRESSURE RELIEF
AGITATOR
FILL MANIFOLD
PRESSURE MANIFOLD
FRESH WATER FILL
FOAM MARKER FILL
HOPPER
VENTURI
EZ control

EZ control functions

Fill Manifold *These functions are only available when external water is being pumped into the system.*	Use
Main tank rinse nozzles	Turning on this function allows the use of the tank rinse nozzles with larger quantities of fresh water making it useful for a more thorough flushing/decontamination.
Fresh water fill	Used to fill the rinse water tank.
Foam marker fill	Used to fill the foam marker tank.
Transcal rinse	Allows external fresh water to be used in rinsing the transcal ciruit.
Pressure Manifold *These functions only available when the main spray pump is operating - pressurising the system.*	
Hopper	Turn ON to use induction hopper
Venturi	Turn ON to use transcal or chemical probe
Agitator	Turn ON to activate agitator
Bypass	Turn ON bypass when in spray mode
Pressure relief	Used to adjust manifold pressure
Other	
1: Main tank fill	Used to direct external water delivery to main tank. When the main tank fill ball valve is on, the other functions of the fill manifold can be used, however they will not be under pressure as only a small amount of flow will be directed to the fill manifold.
2: Chem probe coupling	Connect the chem probe to suck chemical directly from the drum.
3: Bypass	Turn ON bypass when in spray mode
4: Suction selection valve	Turn ball valve to suck from either main tank or fresh water tank
5: Control valve	The control valve regulates the flow being directed to the booms.
6. Pressure relief valve	Used to set maximum system pressure
7. Manifold pressure gauge	Used to set manifold pressure with relief valve

Filling

When filling the machine it is necessary to connect to an external water source.

The main tank should always be filled through the quick fill. This line fills through the top of the tank and then through a hose inside the tank so that the water is deposited in the centre of the tank. Water can then be pumped into the system from an external pump.

The following steps should be used as a guide to filling the machine:

Main tank fill:

1. Connect the fill hose (not supplied) to quick fill cam lock coupling.
2. Make sure that the "main tank fill" handle on the EZ control is in the OFF position (so that there can be no flow coming out of the tank if it is not already empty).
3. Turn the fresh water pumping system on (make sure the pressure does not exceed 100psi)
4. Turn "main tank fill" handle on EZ control to ON. The main tank should now be filling.
5. When the required amount of water has been transferred into the main tank, stop the flow by turning the "main tank fill" to OFF.

EZ Control

External water delivery station:

The external water delivery station allows several filling functions of the sprayer to be performed simultaneously.

1. With fresh water coming into the system as per "Main tank fill" instructions, ensure that all flip valves, including the "main tank fill" ball valve, on the external water delivery station are turned to OFF.
2. Turn the desired function ON by selecting the appropriate flip valve as labelled.
3. When filling the foam marker tank, ensure that the foam marker tank is vented.
4. When the required amount of water has been transferred, turn the appropriate flip valve to OFF.
5. When all functions have been performed, turn the external water delivery system OFF.

Adding chemical to the main tank:

Where chemical induction equipment (chemical probe, induction hopper, transcal or DCI) has been fitted, please refer to the instructions on operating this equipment at the rear of this manual.

Spray application

After completing the filling process, you are now ready to start spraying. While travelling from the fill station to the field, the pump should be operating at 450 - 540 rpm with the agitator operating to ensure that the chemical mix is adequately agitated prior to spraying.

NOTE: The following information is provided as a guide only. It is the responsibility of the operator to assess the conditions in the field where the spray application is taking place

1. Enter the field, unfold boom and set the boom to desired height above the target and have pump running.
2. Switch on the console and set to run in self test mode (while stationary). Information on running in self test mode can be found in the Raven operators manual supplied.
3. Turn on all boom sections
4. Remain stationary until all boom lines have been completely purged with product from the main tank.
5. Switch off all boom sections.
6. Commence travel on primary swath and engage boom master switch and all boom sections. The auto rate controller will now control application based on the calibration information entered by the operator.
7. To avoid overlap it is recommended that individual boom section switches are used to turn

on/off sections as needed.

8. When you have completed the task at hand, please follow the flushing instructions to ensure that all plumbing is flushed.

Agitation

To acheive satisfactory agitation:
The following guidelines are recommended.

1. Add 20 percent of the tanks volume of fresh water to the main tank.
2. Add all chemicals.
3. Add the remaining quanity of water required.
4. Turn the agitator on with the pump at operating speed.

NOTE: Check to ensure that the supermix agitator is working (there should be a visible circulation of water near the back of the tank near the agitator).

5. If the tank has been filled and the spray mixture has been allowed to settle, agitate for as long as it takes the pump to pump the quantity of water in the tank. For example: with 4000 litres in the tank with a 160l/min pump agitate for 4000/250 = 25 minutes.

To agitate while spraying:
Have the bypass ball valve and agitator ball valves OPEN.

Flushing

The following information is provided as a general guide for flushing your sprayer following a spray application.

For more specific information regarding flushing, and decontamination, specific to the products that you are applying, it is recommended that you consult the chemical label or your chemical supplier.

To use the flush water tank to flush pump & boom only:

1. Turn pump off
2. Turn 3 way suction selection valve to draw from flush water tank rather than main product tank.
3. Set Raven console into manual mode.
4. Switch all boom sections to ON
5. Turn off bypass tap, then hold increase button for 15-20 secs. This will ensure that standard valve is fully open to direct all flow to booms (This will eliminate bypass from the booms to main tank).
6. Turn pump ON. The pump will now draw water from the flush water tank and direct all flow to the booms.
7. Keep boom switches on until the contents of the flush water tank has been run through the booms.

To flush entire system (pump, boom & tank)

1. Drain the main tank.
2. Connect to external water source (to provide fresh water supply).
3. Turn main tank fill tap OFF to direct external water supply to the fill manifold under pressure.
4. Engage tank rinse nozzles with the flip valve on EZ control (if fitted) and allow rinsate to drain out through the main tank drain.
5. Close main tank drain.
6. Add a quantity of fresh water (a minimum of approximately twice the pumps capacity) to the main tank (as per instructions under filling).
7. Turn on pump with agitator and bypass open to allow fresh water to circulate.
8. Turn off all taps to allow the pressure relief valve to blow off and purge the "relief to tank" line.
9. Operate induction equipment (if fitted), with a quantity of fresh water in order to flush venturi system.
10. Once complete drain chemical induction hopper (where fitted) delivery hose externally.
11. Now follow the instructions for boom flushing as above - keep ball valve drawing from main tank.

Decontamination

Decontamination of your spraying equipment is important when changing chemicals or application methods.

Information specific to your circumstances, the spraying equipment being used and the chemicals being applied should be provided by your agronomist of chemical supplier.

Follow the flushing instructions above, while using the appropriate decontaminating agent.

End of day

At the end of the spraying day: Follow the flushing and decontamination procedure as per previous instructions.

1. Unfold the boom in an area convenient to dispose of residual chemical (an area where chemical can not run-off into above ground or sub surface water courses).
2. Clean all filters.
3. Clean all nozzles.
4. Wash down unit
5. Drain main tank

CAUTION: If the sprayer is left attached to the tractor when parking the sprayer, make sure the tractor park brake is applied, the engine turned off and the sprayer is securely hitched to the tractor.

If the sprayer is to be disconnected from the tractor:

1. Ensure the main tank and any other tanks are empty.
2. Lower the jack and wind down until weight is taken off tractor.
3. Remove drawbar pin.
4. Remove safety chains.
5. Disconnect all drawbar connections between the sprayer and the tractor (i.e. tail lights, foam marker lines, electric controls etc.)
6. Where fitted, remove the PTO shaft from both the sprayer and the tractor.
7. Protect hydraulic hoses and electrical connections.

NOTE: Store the sprayer in a suitable location to prevent freezing. If the sprayer is to be left where freezing may occur, cover the pump and flow meter with a material bag and empty pump and flow meter of all water (run the pump dry for 15-20 seconds). Make sure any ice has thawed before using sprayer.

End of program

If the sprayer is to be stored for a long period of time without use, there are several tasks that need to be performed.

- Clean the sprayer thoroughly as described under "END OF DAY" tasks.
- With the sprayer attached to the towing vehicle, carry out a thorough observation to determine if there is any damage to the sprayer.
- Park the sprayer in a position where it will not be affected by frosts, and preferably out of direct sunlight.
- Ensure the main tank and any other tanks fitted are empty.
- Lower the jack and wind until weight is taken off tractor.
- Remove drawbar pin.
- Remove safety chains.
- Disconnect all drawbar connections between the sprayer and the tractor (i.e. tail lights, foam marker lines, electric controls etc.)
- Where fitted, remove the PTO shaft from both the sprayer and the tractor and store with the sprayer.

If necessary, remove consoles from cabin and store in a safe and secure location.

- Protect hydraulic hoses and electrical connections.

Transporting the sprayer

1. Make sure the tractor has sufficient lifting and braking capacity to tow the sprayer.
2. All relevant transport regulations must be adhered to when transporting the sprayer. (ie: speed regulations, oversize signs, flashing light, etc.) It is the operator's responsibility to know the relevant regulations.
3. Make sure the sprayer is securely hitched to the tractor.
4. Ensure that the boom is securely supported when travelling and that the tail/indicator lights on the sprayer are connected via the 7-pin trailer plug (if fitted on sprayer)
5. Where a road pack has been installed connect tail light plug.

CAUTION: Take care when reversing with the sprayer attached. If driver visibility is restricted use another adult, with a clear view to the rear of the sprayer, to give reversing directions.

CAUTION: It is the operator's responsibility to know the tare weight and gross weight of the sprayer. Contact Goldacres dealer to ascertain a more precise tare weight for your sprayer if unsure. If any alterations are made to the sprayer, it is the operator's responsibility to know the tare weight and the gross weight of the modified sprayer at all times.

Chapter 7

DELTA BOOM

General

All booms present a number of safety hazards due to their operation - the operator should read and fully understand the safety instructions in this manual prior to operation.

Goldacres Delta booms have been designed and built to ensure many years of trouble free service. Aluminium outer boom sections are used on booms larger than 24 metres reduce the overall weight of the boom and aid in providing a superior boom ride and longevity.

CAUTION: Goldacres do not endorse use of this machine for spraying at speeds greater than 20 km/hr

CAUTION: Before adjusting the boom alignment, the hydraulic fold circuit must be free of air. Hydraulic circuits that contain air can make the boom appear that it is too far forward. Adjustment of the boom without "bleeding" the hydraulic circuit first will result in a boom that quickly reverts to hanging out of alignment to the back.

CAUTION: All chemicals have corrosive properties to some degree. Prevent damage to the machine by always consulting the chemical MSDS or the chemical supplier for advice concerning the corrosive properties of the chemical. It is the responsibility of the operator to carry out preventative and ongoing maintenance to the machine, particularly while applying chemicals with highly corrosive properties. Machine components should be coated with a suitable protectant prior to use, and then washed down, thoroughly, immediately after every application. Consult the supplier of the substance if you require specific advice about the effectiveness of any particular protectant to prevent premature degradation of machine components.

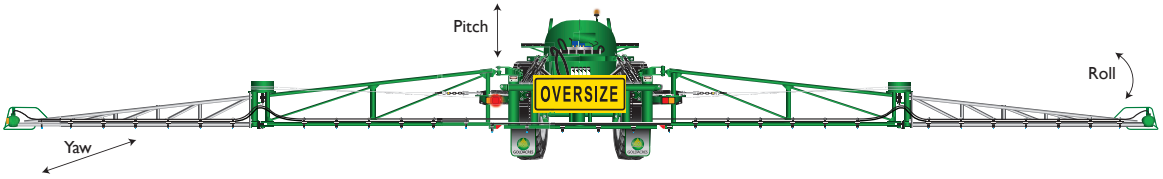
Delta booms feature a unique (patented) boom suspension system.

This system provides suspension in three directions:

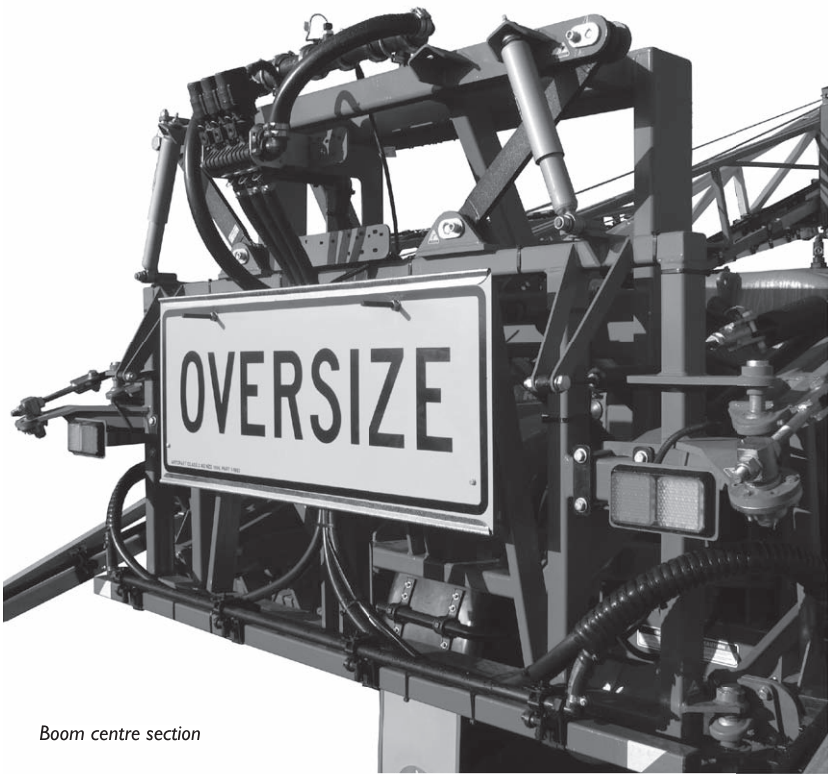
Pitch: Hydraulic cylinders and accumulators dampen the vertical boom movement encountered over rough ground conditions.

Roll: Shock absorbers help maintain constant boom height over sloping and uneven ground.

Yaw: Shock absorbers and springs over come the erratic whipping movement, which creates undue stress on the boom frame and uneven spray application.

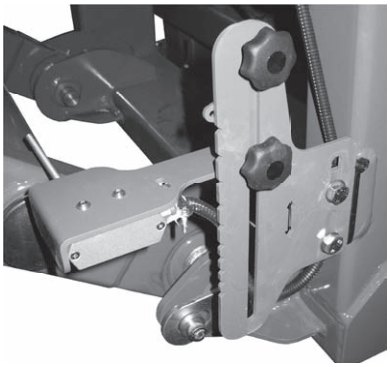


Boom key features



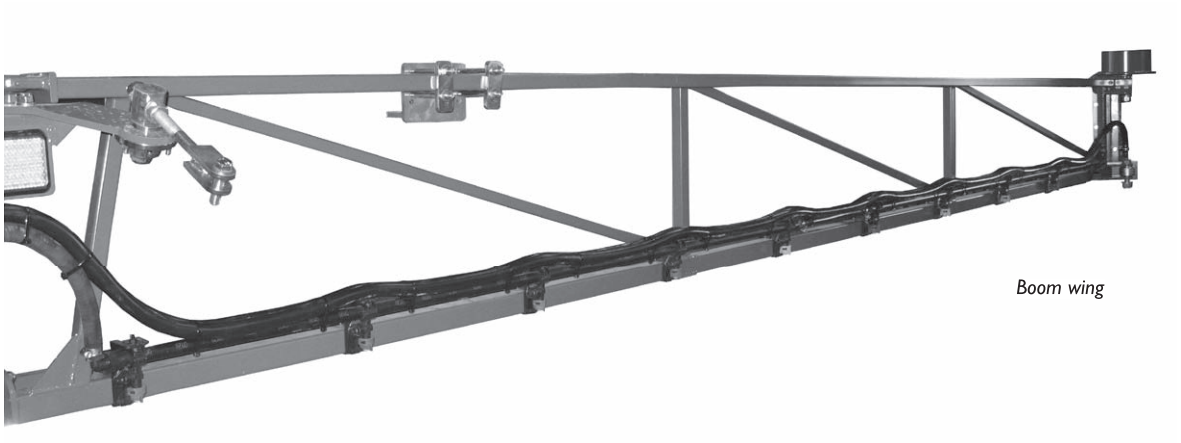
Boom centre section

Paralift side shot



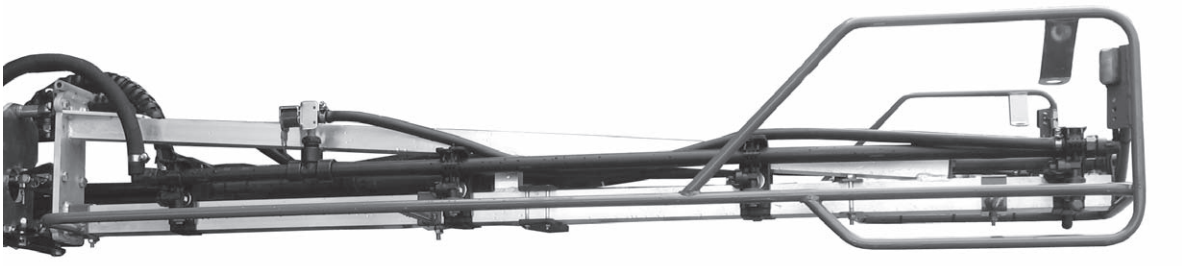
Boom height limit switch

Boom key features



Boom wing

Boom outer wing

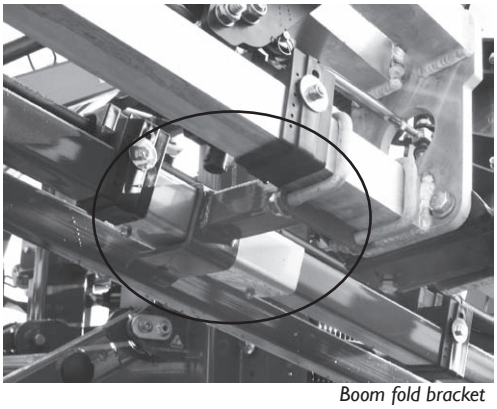


3D breakaway hinge with boom end protector fitted

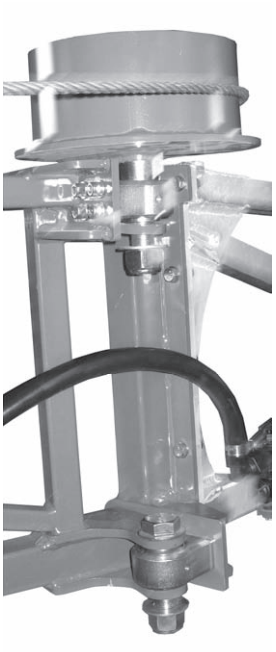
Boom key features

Boom rest

Boom protectors



Boom fold bracket



Cable drum / boom pivot

Boom bump stop

Boom overview

Centre Section

The Delta centre section is made up of two components, the paralift rear and the boom centre section. The two are held together by delta links. These links allow the boom to be suspended in order to provide roll and yaw suspension.

Roll suspension is when the boom pitches up and down at the tips. Yaw suspension is when the boom moves fore and aft at the tips. If the boom did not feature yaw suspension there would be excessive stresses exerted on the booms and centre section when cornering or corrections of line are made. The yaw suspension allows the chassis of the sprayer to move left and right without any movement being transferred to the boom. The paralift rear will move with the centre of the sprayer but the boom centre section will remain static or level as it rotates around the delta links connecting it to the paralift rear.

The boom yaw is dampened by springs and dampener shockers to limit the recoil of the yaw springs. If the springs are not tensioned correctly the boom will be able to yaw excessively and the springs may be damaged. If a spring is damaged, both opposing springs must be replaced at the same time.

The overall yaw travel is limited by rubber bumpers mounted to the paralift rear. If the boom centre section yaws excessively the centre section will contact these and cushion the travel by collapsing the block. If the block collapses totally the yaw travel will be stopped. If the boom is continually yawed excessively this block will wear out and require replacement.

Hydraulic raise and lower

The paralift on a Delta boom enables the boom to be raised and lowered to maintain a consistent boom height above the target.

Delta booms feature a paralift rear which uses two hydraulic cylinders to perform the lift, while also acting as a component providing the vertical suspension. Each hydraulic cylinder has a nitrogen charged accumulator which also assists in improving the boom ride. The "boom limit" height switch allows the operator to adjust the minimum ride height of the boom. Boom maintenance information can be found in the "maintenance" chapter of this manual.

The hydraulic lift also enables the boom to be raised prior to folding and then used to lower the boom onto the boom rests.

Hydraulic fold

The Delta booms hydraulic fold feature, allows the boom to be opened and closed from within the tractor cabin via the tractor hydraulic system.

Hydraulic phasing cylinders are used in the folding operation of the boom. This ensures that both sides of the boom are synchronised and open and close together so that the weight distribution is the same for both sides of the boom.

As hydraulic fluid enters one hydraulic cylinder, it acts upon the first ram and causes it to move. This motion results in an amount of fluid entering the second hydraulic cylinder which causes it to move an equivalent distance. There is also a flow restrictor for each cylinder so that the hydraulic fluid will enter and leave the respective cylinders at a controlled rate. This has the effect of slowing down the rate of fluid transfer and thus causes the boom to open and close more slowly - protecting the boom from damage. If the phasing cylinders do not fold together, information on re-phasing the rams can be found in the "maintenance" chapter.

Boom balance

The Delta boom suspension system causes the boom to adpot the same plane as the spray tanker. If one side is heavier than the other, the boom will tend to hang lower on the heavy side, so both sides need to be balanced for the boom ends to be of the same height.

To acheive this, a boom counterweight can be included on the boom and placed strategically so that it compensates and balances the boom. The counterweight can have more weight added and/or be moved to balance the boom correctly.

Boom cables

Boom cables are a critical part of the Delta boom and it is important to ensure that boom cables are correctly adjusted prior to operation.

Loose boom cables can cause boom damage by allowing the outer boom section to hang out of alignment or to 'break away' too easily. This can

shorten the sprayers life by placing unnecessary stresses on the boom, lift and chassis.

The cable tension can be checked by inspecting the cable springs, Further information on boom adjustment and alignment can be found in the "maintenance" section.

Boom valves

Motorised boom valves are fitted as standard and are mounted on the boom centre section at the rear of the sprayer. Motorised boom valves feature a 12 volt motor that opens or closes a stainless steel plunger and thus opening or closing flow to the boom sections as required.

In the event of a valve failure, unscrew the top cap of valve then check that the fuse (3 amp) is ok.

Nozzles

The standard nozzle spacing on Goldacres booms is 500mm. Nozzles are mounted on brackets that are adjustable for different nozzle types. Nozzles are mounted so that they are protected from ground hits should the boom make contact with the ground, obstructions or crop.

As information regarding nozzles is specific to those being used in your application, no specific reference is made to nozzle application rates or types in this operator's manual. Goldacres suggest the use of a current TeeJet nozzle selection catalogue for reference to nozzle sizes, outputs, spray patterns and general spraying information. For more technical information on the function of spray nozzles and factors affecting their performance you can also use the TeeJet "User's guide to spray nozzles".

The TeeJet nozzle selection catalogue and Users guide to spray nozzles are available from Goldacres dealers, or as a free download from the TeeJet website: www.teejet.com

Three dimensional breakaway

24 metre Delta booms and all Tri Tech booms feature the unique three dimensional breakaway hinge which allows the tip to "break" forward, backward and upward if an obstruction is hit. The 3D breakaway hinge aims to eliminate any further damage to the remainder of the boom should an obstruction be hit.

It is important that the 3D breakaway hinge is properly adjusted when in operation. Adjustment instructions can be found in the "maintenance" chapter.

Boom protection brackets

Stainless steel boom protectors are fitted on the boom to protect the boom when resting on the boom rests for transport. It is important to ensure that the boom protection brackets are fitted correctly.

Boom options

Fence line jets

Goldacres offer manually and electrically operated fence line jets. The 'fenceline' jet is designed to enable the operator to spray right up to the boundary fence without having the boom too close to the fence.

The angle of the off-centre jet can be altered to suit particular applications but it should enable the boom to be inside the fence by about 1 metre and still be able to spray to the fence. This should prevent operators from putting the boom into the fence, especially important when the boom is relatively new and the operator is not familiar with the width of the boom. The fenceline jet should be turned off after the end of the first lap and this can be done either manually via a tap or remotely via an optional electric solenoid (controlled in the cabin).

Hydraulic tilts

Delta booms can incorporate a hydraulic tilt option, which allows the individual boom sides to be raised independently when in the working position. This serves to provide greater variability of boom height control to compensate for undulating ground conditions. Boom tilts are operated from a lever or switch in the cabin. (depending on hydraulic system fitted).

The use of tilt cylinders should be kept to a minimum as the the tilt operation affects the balance of the boom causing rocking of the whole boom assembly.

Where hydraulic tilts are not fitted, a fixed link is placed in substitute for the tilt cylinder.

Boom operation

Folding

The boom fold sequence is as below:

1. Starting with the boom in the working position, use the lever/switch in cabin to raise the boom fully.
2. Use the lever/switch to fold the boom completely in.
3. Lower the boom until the boom just touches the rests
4. Then continue to lower the boom a further 100mm so as to put sufficient weight onto the rests. The rests need to be positioned high enough to allow the boom to lower 100mm without the boom resting on the tyres or mudguards.

NOTE: Booms must not be folded, or unfolded, while the sprayer is moving. When the boom is between fully open and fully closed , there can be large stresses placed on many boom components. If the sprayer is moving and hits a bump, severe damage to the boom can occur.

NOTE: The booms must be folded continuously without stopping and starting during the sequence.

Un-folding

The boom unfold sequence is as below:

1. Raise the boom fully to clear the boom rests.

2. Use the lever/switch in cabin to unfold the boom so that the boom is aligned with the centre section.

3. Lower the boom to the desired height above the target.

NOTE: The booms must be folded continuously without stopping and starting during the sequence.

Chapter 8

TRI-TECH BOOM

General

All booms present a number of safety hazards due to their operation - the operator should read and fully understand the safety instructions in this manual prior to operation.

Goldacres Tri-Tech booms have been designed and built to ensure many years of trouble free service. Aluminium outer boom sections reduce the overall weight of the boom and aid in providing a superior boom ride and longevity.

CAUTION: Goldacres do not endorse use of this machine for spraying at speeds greater than 20 km/hr

CAUTION: Before adjusting the boom alignment, the hydraulic fold circuit must be free of air. Hydraulic circuits that contain air can make the boom appear that it is too far forward. Adjustment of the boom without "bleeding" the hydraulic circuit first will result in a boom that quickly reverts to hanging out of alignment to the back.

CAUTION: All chemicals have corrosive properties to some degree. Prevent damage to the machine by always consulting the chemical MSDS or the chemical supplier for advice concerning the corrosive properties of the chemical. It is the responsibility of the operator to carry out preventative and ongoing maintenance to the machine, particularly while applying chemicals with highly corrosive properties. Machine components should be coated with a suitable protectant prior to use, and then washed down, thoroughly, immediately after every application. Consult the supplier of the substance if you require specific advice about the effectiveness of any particular protectant to prevent premature degradation of machine components.

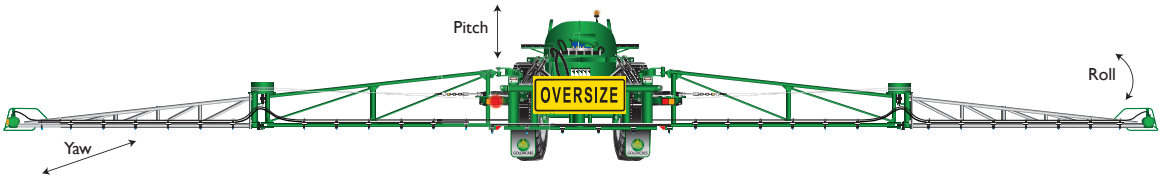
Tri Tech booms feature a unique (patented) boom suspension system.

This system provides suspension in three directions:

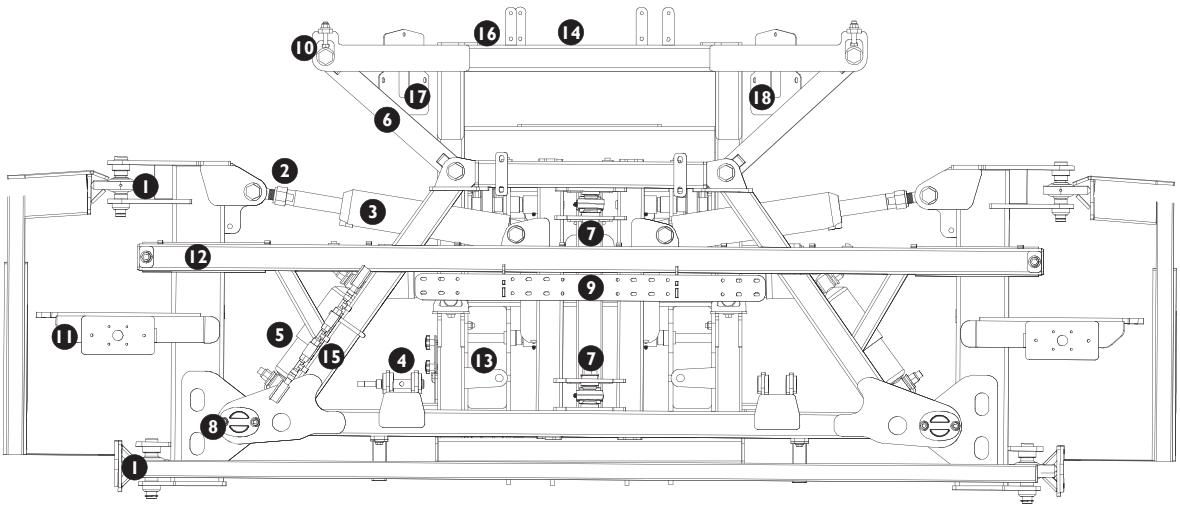
Pitch: Hydraulic cylinders and accumulators dampen the vertical boom movement encountered over rough ground conditions.

Roll: Shock absorbers help maintain constant boom height over sloping and uneven ground.

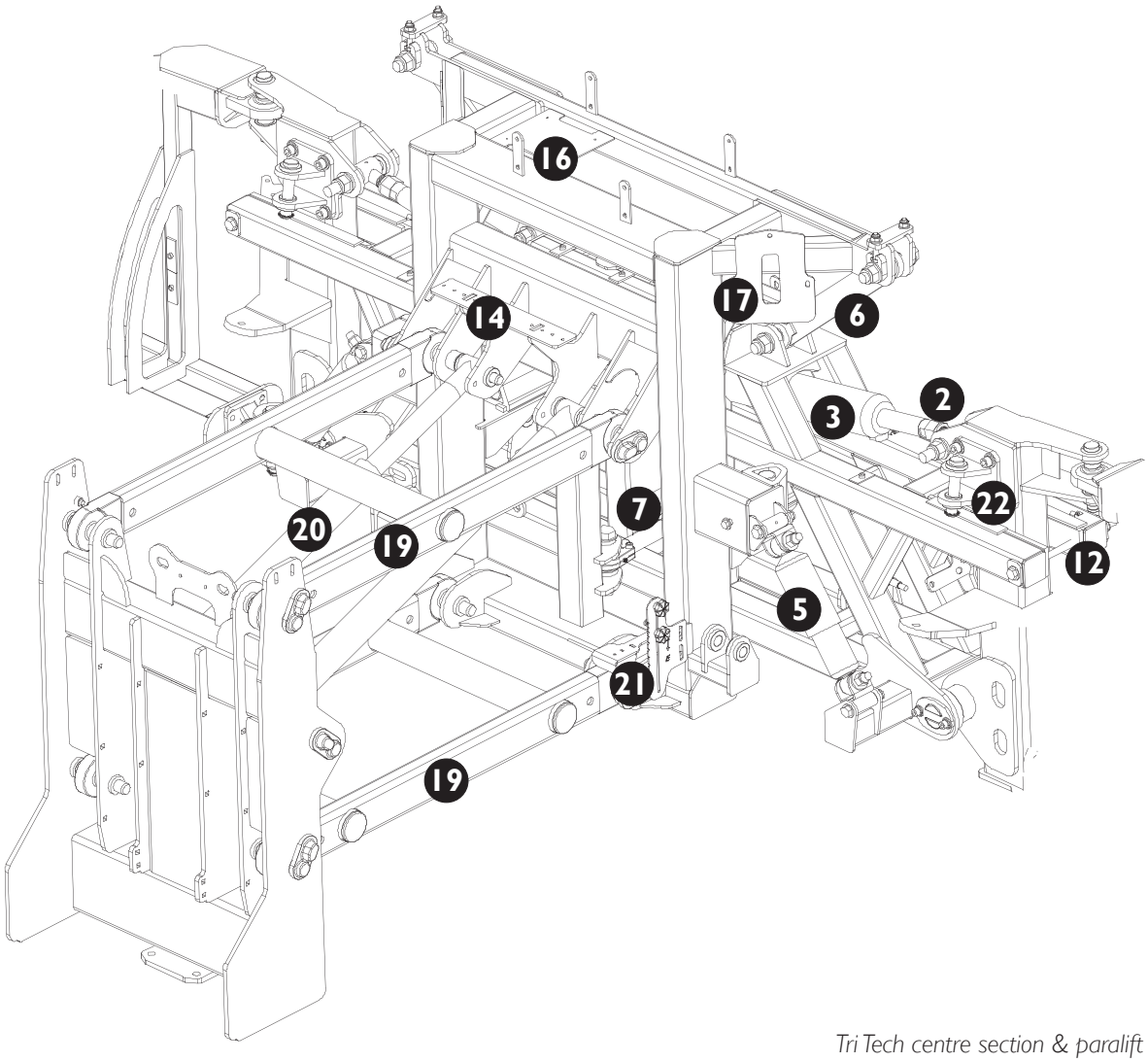
Yaw: Shock absorbers and springs over come the erratic whipping movement, which creates undue stress on the boom frame and uneven spray application. (Hydraulic Yaw suspension is an option)



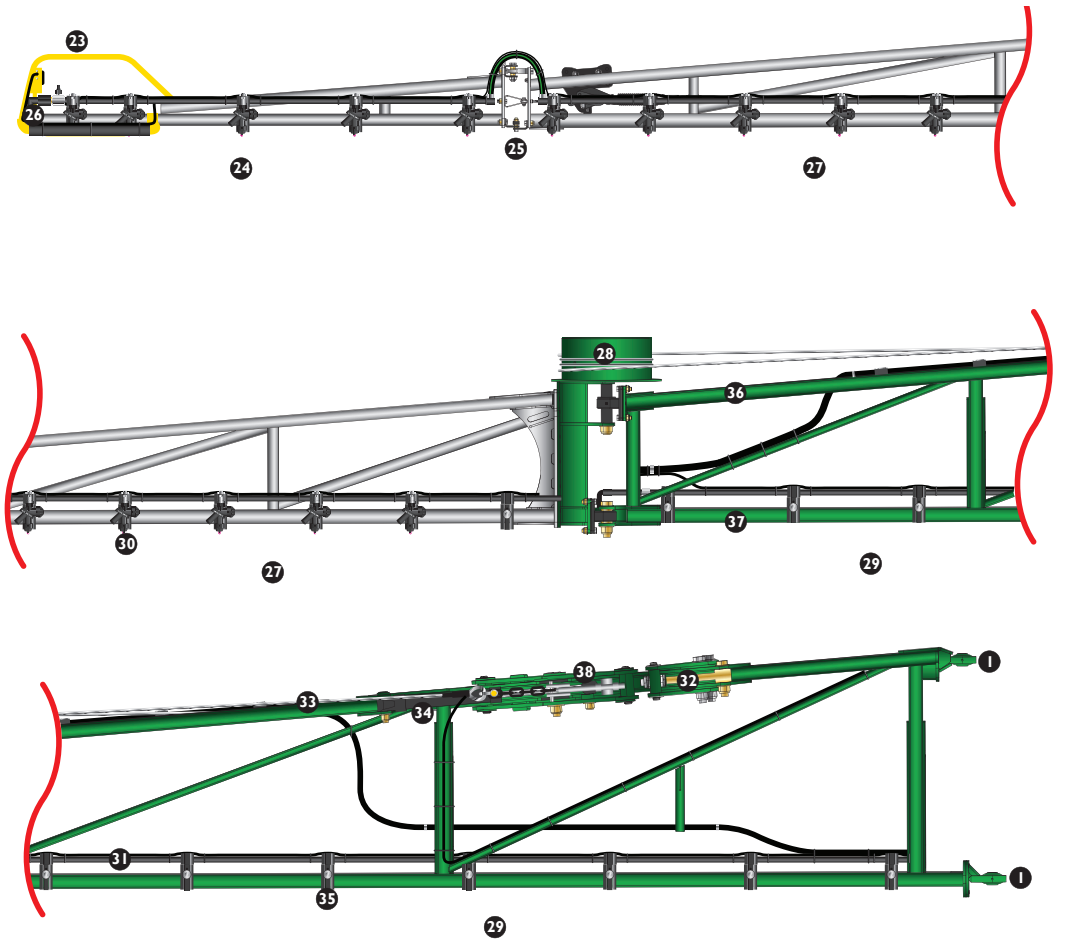
Boom key features



Tri Tech centre section



Tri Tech centre section & paralift



Tri Tech boom wings

Number	Feature
1	Boom rose end
2	Tilt arm adjuster
3	Tilt cylinder (option)
4	Yaw spring (or cylinder) mount
5	Roll shocker
6	Diagonal delta links
7	Lineal delta links
8	Tilt pin (60mm)
9	Boom section controls
10	Boom alignment adjuster
11	Tail light mounting plate
12	Tilt arm wear strips
13	Hydraulic yaw accumulators (option)
14	Hydraulic spool valves (option)
15	Hydraulic yaw controls (option)
16	Flow meter
17	Accuboom node (option)
18	Autoboom node (option)
19	Paralift arms

Number	Feature
20	Lift cylinders
21	Boom lower limit switch
22	Bolt on fold cylinder mount
23	Boom end protector
24	Boom wing tip
25	3D breakaway
26	Fenceline jet
27	Boom aluminium outer
28	Boom cable drum
29	Boom steel inner
30	Nozzle & bracket (Trijet pictured)
31	Boom line
32	Adjuster for fold ram
33	Boom cable
34	Hydraulic fold cylinder - for bi-fold
35	Adjustable nozzle bracket
36	Boom top chord (R.H.S)
37	Boom bottom chord (R.H.S)
38	Cable adjuster

Boom overview

Centre Section

The Tri Tech centre section is made up of two components, the paralift rear and the boom centre section. The two are held together by delta links. These links allow the boom to be suspended in order to provide roll and yaw suspension.

Roll suspension is when the boom pitches up and down at the tips. Yaw suspension is when the boom moves fore and aft at the tips. If the boom did not feature yaw suspension there would be excessive stresses exerted on the booms and centre section when cornering or corrections of line are made. The yaw suspension allows the chassis of the sprayer to move left and right without any movement being transferred to the boom. The paralift rear will move with the centre of the sprayer but the boom centre section will remain static or level as it rotates around the delta links connecting it to the paralift rear.

The boom yaw is dampened by 2 large springs (1 each side) and 2 dampener shockers to limit the recoil of the yaw springs. These springs must be tensioned all the way. If the springs are not tensioned correctly the boom will be able to yaw excessively and the springs may be damaged. If a spring is damaged, both opposing springs must be replaced at the same time.

The overall yaw travel is limited by rubber bumpers mounted to the paralift rear. If the boom centre section yaws excessively the centre section will contact these and cushion the travel by collapsing the block. If the block collapses totally the yaw travel will be stopped. If the boom is continually yawed excessively this block will wear out and require replacement.

Hydraulic raise and lower

The paralift on a Tri Tech boom enables the boom to be raised and lowered to maintain a consistent boom height above the target.

Tri Tech booms feature a paralift rear which uses two hydraulic cylinders to perform the lift, while also acting as a component providing the vertical suspension. Each hydraulic cylinder has a nitrogen charged accumulator which also assists in improving the boom ride. The "boom limit" height switch allows the operator to adjust the minimum ride height of the boom. Boom maintenance information can be found in the "maintenance" chapter of this manual.

The hydraulic lift also enables the boom to be raised prior to folding and then used to lower the boom onto the boom rests.

Hydraulic fold

The Tri Tech booms hydraulic fold feature, allows the boom to opened and closed from within the tractor cabin via the tractor hydraulic system.

Hydraulic phasing cylinders are used in the folding operation of the boom. This ensures that both sides of the boom are synchronised and open and close together so that the weight distribution is the same for both sides of the boom.

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Boom balance

The Tri Tech boom suspension system causes the boom to adpot the same plane as the spray tanker. If one side is heavier than the other, the boom will tend to hang lower on the heavy side, so both sides need to be balanced for the boom ends to be of the same height.

To acheive this, a boom counterweight can be included on the boom and placed strategically so that it compensates and balances the boom. The counterweight can have more weight added and/or be moved to balance the boom correctly.

Boom cables

Boom cables are a critical part of the Tri Tech boom and it is important to ensure that boom cables are correctly adjusted prior to operation.

Loose boom cables can cause boom damage by allowing the outer boom section to hang out of alignment or to 'break away' too easily. This can shorten the sprayers life by placing unnecessary stresses on the boom, lift and chassis.

The cable tension can be checked by inspecting the cable springs, Further information on boom adjustment and alignment can be found in this chapter.

Boom valves

Motorised boom valves are fitted as standard and are mounted on the boom centre section at the rear of the sprayer. Motorised boom valves feature a 12 volt motor that opens or closes a stainless steel plunger and thus opening or closing flow to the boom sections as required.

In the event of a valve failure, unscrew the top cap of valve then check that the fuse (3 amp) is ok.

Nozzles

The standard nozzle spacing on Goldacres booms is 500mm. Nozzles are mounted on brackets that are adjustable for different nozzle types. Nozzles are mounted so that they are protected from ground hits should the boom make contact with the ground, obstructions or crop.

As information regarding nozzles is specific to those being used in your application, no specific reference is made to nozzle application rates or types in this operator's manual. Goldacres suggest the use of a current TeeJet nozzle selection catalogue for reference to nozzle sizes, outputs, spray patterns and general spraying information. For more technical information on the function of spray nozzles and factors affecting their performance you can also use the TeeJet "User's guide to spray nozzles".

The TeeJet nozzle selection catalogue and Users guide to spray nozzles are available from Goldacres dealers, or as a free download from the TeeJet website: www.teejet.com

Three dimensional breakaway

Tri Tech booms feature the unique three dimensional breakaway hinge which allows the tip to "break" forward, backward and upward if an obstruction is hit. The 3D breakaway hinge aims to eliminate any further damage to the remainder of the boom should an obstruction be hit.

It is important that the 3D breakaway hinge is properly adjusted when in operation. Adjustment instructions can be found in this chapter.

Boom protection brackets

Stainless steel boom protectors are fitted on the boom to protect the boom when resting on the boom rests for transport. It is important to ensure that the boom protection brackets are fitted correctly.

Three tier system (3TS)

The 3TS system (when fitted) uses twin boom lines and the Raven SCS4400. It's simply a matter of programming into the SCS4400 console the two predetermined flow rates at which point you wish the tiers to change. Nothing else needs to be done by the operator, and it is a very simple system to operate.

For information on 3TS boom tier programming refer to the "calibration" section of this manual.

Boom options

Fence line jets

Goldacres offer manually and electrically operated fence line jets. The 'fenceline' jet is designed to enable the operator to spray right up to the boundary fence without having the boom too close to the fence.

The angle of the off-centre jet can be altered to suit particular applications but it should enable the boom to be inside the fence by about 1 metre and still be able to spray to the fence. This should prevent operators from putting the boom into the fence, especially important when the boom is relatively new and the operator is not familiar with the width of the boom. The fenceline jet should be turned off after the end of the first lap and this can be done either manually via a tap or remotely via an optional electric solenoid (controlled in the cabin).

Hydraulic tilts

Tri Tech booms can incorporate a hydraulic tilt option, which allows the individual boom sides to be raised independently when in the working position. This serves to provide greater variability of boom height control to compensate for undulating ground conditions. Boom tilts are operated from a lever or switch in the cabin. (depending on hydraulic system fitted).

The use of tilt cylinders should be kept to a minimum as the the tilt operation affects the balance of the boom causing rocking of the whole boom assembly.

Where hydraulic tilts are not fitted, a fixed link is placed in substitute for the tilt cylinder.

Boom operation

Folding

The boom fold sequence is as below:

1. Starting with the boom in the working position, use the lever/switch in cabin to raise the boom fully.
2. Use the lever/switch to fold the boom completely in.
3. Lower the boom until the boom just touches the rests
4. Then continue to lower the boom a further 100mm so as to put sufficient weight onto the rests. The rests need to be positioned high enough to allow the boom to lower 100mm without the boom resting on the tyres or mudguards.

NOTE: Booms must not be folded, or unfolded, while the sprayer is moving. When the boom is between fully open and fully closed , there can be large stresses placed on many boom components. If the sprayer is moving and hits a bump, severe damage to the boom can occur.

NOTE: The booms must be folded continuously without stopping and starting during the sequence. Take care not to fold/unfold booms too fast, as damage can be caused.

Un-folding

The boom unfold sequence is as below:

1. Raise the boom fully to clear the boom rests.

2. Use the lever/switch in cabin to unfold the boom so that the boom is aligned with the centre section.

3. Lower the boom to the desired height above the target.

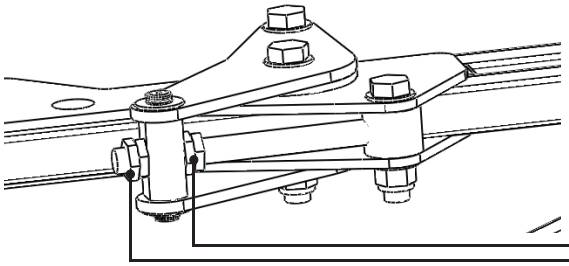
NOTE: The booms must be folded continuously without stopping and starting during the sequence.

Boom adjustment

Alignment of inner steel boom

1. Open the boom fully into the working position.
2. Continue to press the unfold button or hold the hydraulic remote open to ensure the fold cylinders are phased completely.
3. Look along the inner booms between the cable drums to assess the alignment.

   All booms must be 50mm forward of the centre section at the cable drums. A string line can also be used for measuring the lead of the inner boom.



A Tighten nut to adjust the boom backward.

B Tighten nut to adjust the boom forward.

4. If adjustment is required, loosen the two lock-nuts on the boom fold adjuster bolt at the rear of the boom.
5. To adjust the boom forward, tighten the outer adjuster nut. To adjust the boom rearward, tighten the inner adjuster nut
6. When the boom is in the required postion tighten both locknuts to hold in place.
7. Follow this process for both inner booms.

Alignment of outer aluminium boom

1. When adjustment of the inner booms is complete the outer booms can now be aligned.
2. 12-24m Delta booms must be 30-50mm, 24-30m Tritech booms must be 30-50mm and 33-36m booms must be 50mm forward of the inner booms.
3. To align the outer booms, the cable adjusters are used. To pull the outer boom forward the turnbuckle that is connected to the cable damper springs at the front of the boom must be shortened,. At the same time the rear cable adjuster bolt must be lengthened.
4. To adjust the outer boom rearward the rear cable adjuster must be shortened and the turnbuckle at the front lengthened.
5. Once correct alignment has been achieved the cable spring tension must be set so there is a **3mm gap** between the coils.

Note: It is advised that all threads are lubricated prior to making adjustments.

Note: If cable adjustments run out the cable must be rotated on the drum hinge by loosening the cable retaining u-bolts.

Alignment of outer aluminium boom - folded position

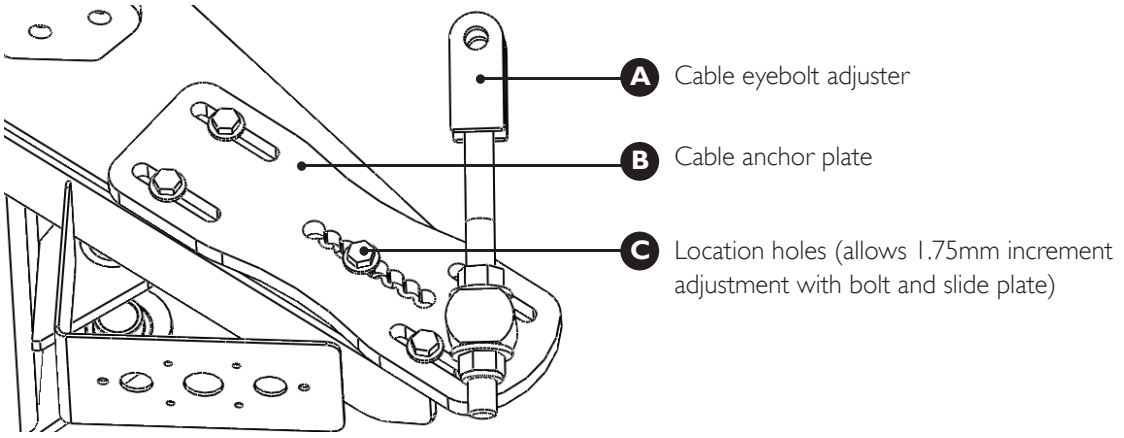
24-36m TriTech booms without Bi-Fold option.

- The eyebolt cable adjuster aligns the outer boom arm in the working position; the adjustment plate is designed to adjust the outer boom arm in the folded position.
- The eyebolt adjuster will follow the same orientation as the boom when folding and unfolding. For example, when the boom is in the operating position the eyebolt adjuster should be horizontal in line with the boom. With the boom folded, the eyebolt adjuster should be pointing forward in a raised position, again following the line of the boom.
- Fold in the boom. If the outer boom arm does not come in all the way against the inner boom arm and contact the bump stop then the

adjustment plate will need to be moved out. If the outer boom arm contacts the bump stop too early and places too much tension on the cable then the adjustment plate needs to be moved inwards.

- To adjust the plate the boom has to be in the working position. Have someone pull back on the outer boom arm to release the tension on the cable whilst you make adjustments to the plate. When adjustment is completed ensure the outer boom arm is released carefully so it does not spring forward dangerously. Re-adjust the cable eyebolt to realign the outer boom arm whilst still in the working position before folding the boom and re-checking the alignment in the folded position.
- Repeat the procedure if necessary until the outer boom arm assumes the correct alignment in both the working and folded positions. When this has been achieved install the bolts (C) and tighten.
- Spring tension may be altered slightly when this plate is moved. Check there is a 3mm gap in the spring coils and adjust if required.

NOTE: If the outer boom arm contacts the bump stop too early and too much tension is placed on the cable, then the hydraulic cylinder may fail to bring both arms all the way in, or damage the boom arms and cable



Vertical boom alignment (working position)

When the boom is in the working position, the inner and outer boom should be level or slightly increasing in height from the centre section to give a consistent and even spray application height. A new boom may be susceptible to stretching or sagging as the components are worn in. Several adjustment may be required in the first 12months of operation until the boom settles.

Inner Booms

- The boom centre section must be level with the chassis before any boom adjustments are made. The centre of the centre section should line up with the centre of the paralift when look from the rear. This can be done by either shortening or lengthening the centre section adjuster bolt at the top delta links, or by adding weight discs to the boom tip.
- The inner booms must be adjusted first so they are the same height as the centre section or slightly increasing in height from the centre section (to allow for boom stretch) .These adjustments are made by lengthening or shortening the tilt adjusters on the tilt cylinder..
- To lengthen or shorten the tilt adjusters, the weight of both the booms will need to be supported.
- When any adjustments are completed. Ensure the lock nuts are tight.

Outer Booms

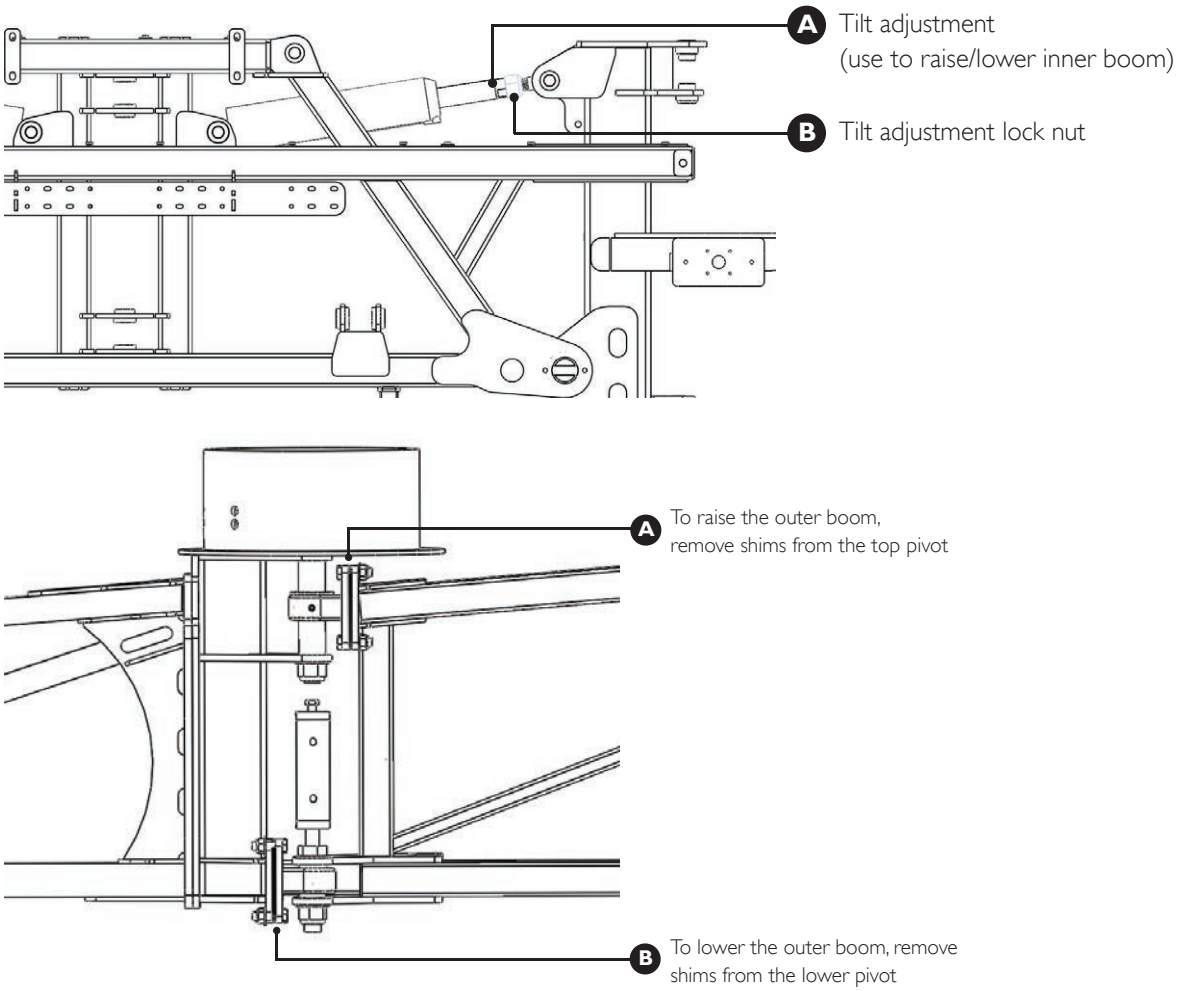
- The height of the outer booms in the working position are adjusted by adding or removing shims at the cable drum.
- The cable drum mounts are assembled in manufacturing with 6-7 shims at the upper and lower bearing blocks.
- If the outer boom hangs lower than the inner boom, remove shims from the upper mount

untill the booms are level.If the outer boom is too high remove shims from the lower bearing block. Retension the retaining bolts to 65Nm when all adjustments are complete.

- The boom cables may need to be loosened to enable easier removal of the shims.

24-30m booms:
1 shim added = 10-20mm @ boom end

33-36m booms:
1 shim added = 20-30mm @ boom end



Vertical boom alignment (folded position)

When the booms are folded up in the transport position, the full weight of the booms must be supported by the inner boom.The outer aluminium boom may sit on the boom rest rubber but must not support any weight.

Inner Booms

- If the boom sits level in the working postion but when folded up, one side is lower than the other, there is one adjustment that can be made.
- Shims can be placed at the bottom boom mount of the lowest boom - refer to diagram A.This will lift the boom in the open position.
- If the boom is not level in the working position, the most likely cause if this is an out of balance boom. Refer to previous boom adjust information.

Note: This process should not be required as once they are set in manufacturing, they should not change

When the booms are folded up in the transport position, the outer boom must saddle onto the inner boom. If this alignement of out the outer boom will

not saddle correctly and will not be supported in transport.

The boom support saddle is bolted to the outer boom and when folded, couples to the inner boom. This saddle must slide onto the inner boom freely to prevent damage to the booms.

Note: This process will be require in the first 6 months of operation as the booms stretch an ware in.

Outer Booms

- If the outer boom hangs too low in the folded position shims must be added to the cable drum pivots. To raise the outer boom, add shims to both the upper and lower pivots. This adjust the angle of the pivot axis causing the outer boom to fold up higher. By adding shims to both the upper and lower pivots, the outer boom height is not affected in the working position.
- To lower the outer boom in the folded position, remove shims from both the upper and lower pivots.
- 1 x 1mm shim at the upper and lower pivots equals approximately 15mm change in height.

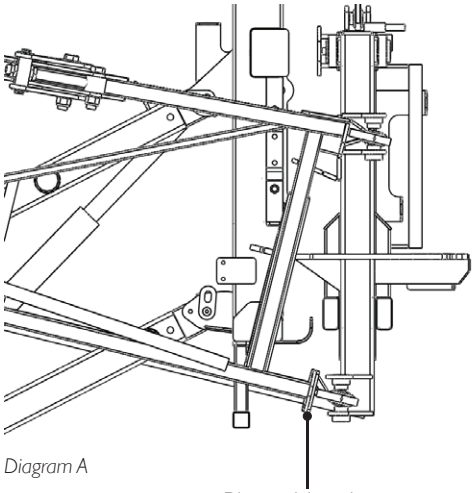


Diagram A

Place shims here

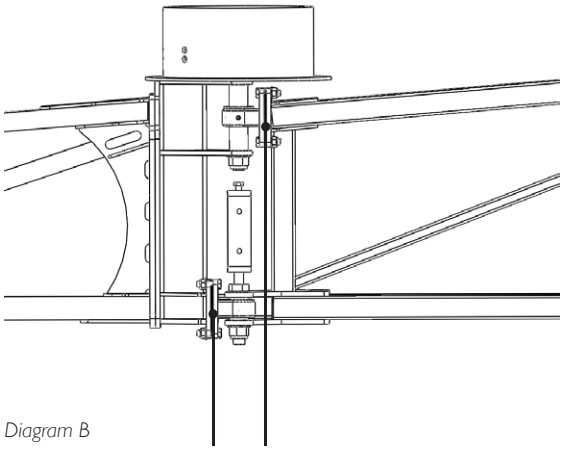
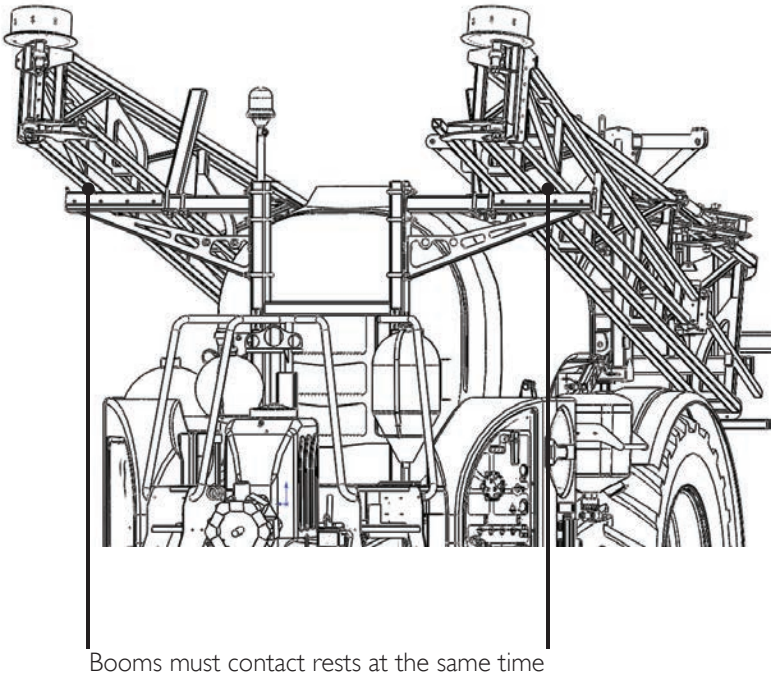


Diagram B

Place shims at both pivots



Booms must contact rests at the same time

Three dimensional breakaway

Initial setup

1. Open the boom fully into the working position and lower to a good working height.

2. Close the ball valves on the two hydraulic lift cylinders for safety purposes.

3. The main hinge mounting plate must be a specific distance from the boom end plate. Measure from the centre of the closest retaining bolt to the boom end plate. This must measure 160mm as shown in the diagram.

4. The bottom mounting plates must have a 4mm gap between them. This can be adjusted by loosening the retaining bolts and sliding these plaes to achieve the required gap.

5. The turnbuckle must now be adjusted. This determines the initial breakaway force required when an object is struck.

   Measure from the top of the bottom boom chord to the centre of the pivot bolt 'A'.

   Measure from the top of the bottom cord to the centre of pivot point 'B'.

   Subtract measurement 'A' from measurement 'B'.

   This must be 17-18mm. If this is less than 17mm, shorten the turnbuckle. If it is greater than 18mm the turnbuckle must be lengthened.

6. The spring tension must be adjusted so there is a 1-2mm gap between the coils. This applies the ideal amount of resistance when breaking away. The spring tension can be adjusted by tightening or loosening the adjustable eyebolt.

   To check the tension a spring fish scale can be used by hooking it on the boom tip. It should require about a 5kg force to breakaway.

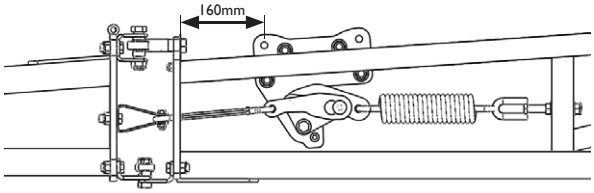
Maintenance

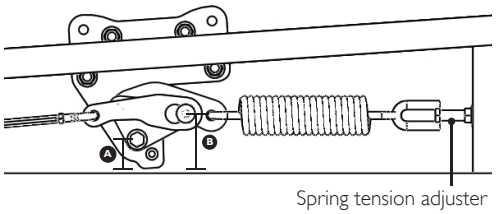
1. Two things are critical in ensuring the breakaway functions correctly. The vertical measurement (17-18mm) shown in step 5, and the tension of the spring.

2. Should the spring eyebolt reach maximum adjustment without applying sufficient tension on the spring, the spring may need to be replaced or the hinge mounting plate may need to be moved closer to the end of the boom.

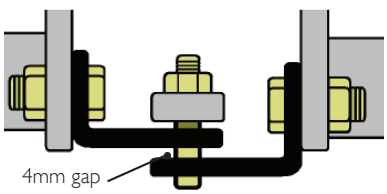
1 If either of these adjustments are made, the turnbuckle must be readjusted.

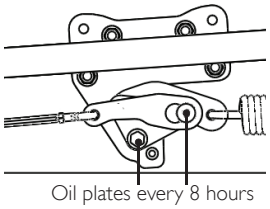
3. To ensure smooth and long lasting operation of your breakaway mechanisms they must be oiled every 8 hours if not adequately lubricated it may lead to premature failure of components.





Spring tension adjuster





Oil plates every 8 hours

Chapter 9

TROUBLESHOOTING

General

The following troubleshooting information is provided as a reference when your sprayer is not functioning correctly.

To ensure that you receive the best possible service, it is recommended that you exhaust all applicable troubleshooting solutions shown in this chapter prior to calling your dealer, or Goldacres, for service advice

Parts information and schematics can be found in the parts manual supplied.

Diaphragm pump

Pressure and flow rate are too low?	
Common causes	Common solutions
Excessive bypass on pressure manifold	• Verify console calibration settings
Supply to pump is restricted	• Check the pressure relief valve setting on pressure manifold
Pump	• Close the ball valve labelled bypass, if the pressure increases on the pump gauge there is a problem with the control valve
	• Measure the flow per minute coming out of one nozzle and check the nozzle chart for the correnspondingflow.
	• Check the fast close valve is rotating the full 90 degrees when the boom valves are switched off.
	• Suction filter may be blocked
	• Check tank sump and suction line blockages
	• Check suction line for air leaks
	• Check pump speed
	• Check oil for colour change. If the oil appears milky, a diaphragm will be damaged and needs to be replaced
	• Check valves in pump

Pressure and flow rate are too high?	
Common causes	Common solutions
Bypass line is restricted or blocked.	• Verify console calibration settings.
	• Check for restriction in bypass line.
	• Check pump speed is not too fast.

The pressure on my gauge my gauge is higher than the nozzle flow indicates?	
Common causes	Common solutions
Blocked filters of nozzles	• Check and clean all pressure and nozzle filters
Flow loss due to resistance in lines, valves and filters.	• Recalibrate console to allow for pressure loss

The flow rate is correct but my pressure is too low or high?	
Common causes	Common solutions
Nozzles	• Check nozzle chart for correct nozzle size

Pressure is fluctuating?	
Common causes	Common solutions
Air leak on suction side of pump	• Check suction pump for air leaks
Incorrect pump speed	• Adjust pump speed so it is between 400 -540rpm
Faulty pump valves	• Replace pump valves

Pump pressure is pulsating?	
Common causes	Common solutions
Air accumulator pressure is incorrect	• Reset the pressure in air accumulator
Air accumulator diaphragm has a leak	• Replace air accumulator diaphragm
Incorrect pump speed	• Adjust pump speed so it is between 400 - 540rpm
Air leak on suction side of pump	• Check pump suction for air leaks

Pump oil is becoming milky?	
Common causes	Common solutions
Cracked diaphragm	• Replace all diaphragms

Pump is noisy?	
Common causes	Common solutions
Low oil level	• Refill or replace oil
Air accumulator pressure set incorrectly	• Recharge air accumulator to specified pressure
Insufficient lubrication on PTO shaft	• Grease PTO shaft
Damaged pump valves	• Replace all bearings • Replace pump valves
Pump suction line has air leak or is restricted	• Clean suction filter and check for leaks in suction lines

Pump housing or mountings are cracked?	
Common causes	Common solutions
PTO shaft not sliding freely or incorrect length	• Check PTO shaft length and lubricate
Extremely cold weather can cause liquid in the pump to freeze	• Check for ice in the pump and let defrost if required

Damaged universal joint?	
Common causes	Common solutions
The shaft is too long	• Shorten shaft
PTO shaft is inadequately lubricated	• Lubricate PTO shaft and uni joints

PTO shaft bent or excessively vibrating?	
Common causes	Common solutions
PTO shaft is too short	• Replace PTO shaft

Flowmeter and controller

Application rate is inaccurate, unstable or zero?	
Common causes	**Common solutions**
Incorrect console calibration	Recalibrate console
Inconsistent wheel speed reading	Test wheel speed sensor
Inconsistent spraying volume	Replace flow meter
Faulty control valve. Check by using manual inc/dec flow control	Replace control valve

Speed sensor display is inaccurate, unstable or zero?	
Common causes	**Common solutions**
Incorrect speed calibration	Recalibrate console speed
Corroded wheel speed sensor cable pins	Clean cable pins
Wheel speed sensor not set up correctly	Ensure that wheel speed magnets are on wheel and that clearance is 12-19mm
Faulty cable	Test cable as per instructions following

Volume display is inaccurate, unstable, zero or not changing?	
Common causes	**Common solutions**
Incorrect speed calibration	Recalibrate console speed
Corroded wheel speed sensor cable pins	Clean cable pins
Wheel speed sensor not set up correctly	Ensure that wheel speed magnets are on wheel and that clearance is 12-19mm
Faulty cable	Test cable as per instructions following

Flowmeter appears to be not working?	
Common causes	**Common solutions**
Flowmeter is seized or blocked	Remove and clean any foreign materials so the turbine spins freely

Application rate or pressure will not alter?	
Common causes	**Common solutions**
Flowmeter is seized or blocked	Test valve manually and replace if required

Control valve has failed?	
Common causes	**Common solutions**
Replace control valve	Temporary solutions: *Dual line plumbing:* Remove the motor from the 3 way ball valve and manually adjust the flow by turning the shaft with a spanner. *Single line plumbing:* Close the bypass line ball valve in front of the control valve. Adjust the ball valve in front of the electric control valve until the desired spraying pressure is shown on the pressure gauge. If the desired spraying pressure is not able to be acheived with the ball valve, adjust the relief valve setting in order to acheive the desired pressure.

Flowmeter failing to give accurate readings?

If the flowmeter fails to give accurate readings, the following procedures should occur:

Adjust the spraying pressure by putting the flow control switch into manual and using the increase decrease switch to adjust to the desired pressure as shown on the pressure gauge on the sprayer

Drive the sprayer at a constant speed in order to apply the required application volume as determined by the nozzle selection chart

The sprayer should then be operated to empty the tank. Once the sprayer is empty of chemical, partially fill the tank with fresh water so that test can be performed in order to correct the problem. Repair or replace the flowmeter as soon as possible.

Console is not working?

Common causes	Common solutions
No power supply	Check loom connection at the back of the console
	Check connection to battery terminals
	Check the fuse in the back of the console is not blown
	With a multi meter, check the voltage potential across pins 1 and 16 on the 16 pin plug going into the console (should be at least 12v)

If the Raven console fails so that it is not able to control the boom valves, and control valve, the following procedures should be adhered to:

1. Disconnect console from console cable.
2. Disconnect console cable from power source (i.e. battery).
3. Remove the plunger and spring from the solenoids. (This will open the boom valves)

To start and stop spraying through the nozzles, start and stop the pump.

NOTE: Care should be taken because there is no agitation while the nozzles are not spraying.

For base model sprayers:

- Adjust the manual pressure relief valve to alter the spraying pressure to the desired pressure as shown by the pressure gauge on the sprayer. If the desired spraying pressure is not able to be achieved, alter the pressure relief valve setting so as to achieve the desired pressure (i.e. alter the adjusting stem).

For sprayers fitted with a dual boom:

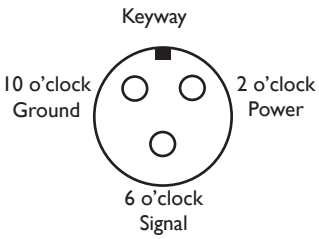
- Remove electric motor from three way fast close valve, and manually rotate valve until desired spraying pressure is achieved.
- Drive the sprayer at a constant speed (as measured by the tractor) in order to apply the required application volume as determined by the nozzle selection chart.

The sprayer should then be able to be operated in order to empty the tank. Once the sprayer is empty of chemical, partially fill the tank with fresh water (no chemical) so that testing can be performed in order to correct the problem. Repair or replace the console as soon as possible.

Testing the speed sensor cable:

1. Change speed cal number to 1000 with the [Speed Cal] key
2. Press [distance] key
3. With a jumper wire (ie: paper clip) short between 6 o'clock and 10 o'clock sockets with a "short" then "no short" motion. Each time contact is made the [distance] total should move up in increments of 1 or more.
4. If the distance does not count up, perform test at the next connector closer to the console. If this next test works, the previous section of cable must be faulty and should be replaced.
5. Perform above voltage checks
6. Change [speed cal] number back to previous number

NOTE: Speed sensor is not repairable and will need to be replaced if faulty.



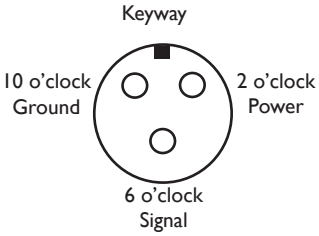
Voltage readings

10 o'clock to 6 o'clock (+5v DC)

10 o'clock to 2 o'clock (+5v DC)

Testing the meter cal cable:

1. Change meter cal number to 1 with the [Meter Cal] key
2. Press [total volume] key and place boom switches ON
3. With a jumper wire (ie: paper clip) short between 6 o'clock and 10 o'clock sockets with a "short" then "no short" motion. Each time contact is made the [total volume] should move up in increments of 1 or more.
4. If total volume does not count up, perform test at the next connector closer to the console. If this next test works, the previous section of cable must be faulty and should be replaced.
5. Perform above voltage checks
6. Change [meter cal] number back to previous number



Voltage readings

10 o'clock to 6 o'clock (+5v DC)

10 o'clock to 2 o'clock (+5v DC)

Tanks, chassis and wheels

The drawbar of the sprayer has become noisy and loose?

Common causes	Common solutions
Worn, or missing, plastic insert in towing eye	Replace plastic insert

Induction hopper

Induction hopper is not performing as well as it should?

Common causes	Common solutions
Insufficient flow to venturi in the hopper bottom	Check the pressure supplied to the hopper bottom about is 400KPa (58psi)
Air leaks on induction system	Check all hoses, clamps, and cam lever fittings are sealed

Chem probe and transcal

Transcal is not working or is working too slow?

Common causes	Common solutions
Air leak in the vacuum system	Check all hose clamps and fittings are tight
The volume of water supplied to the Venturi	Check there are no kinked hoses and the water pressure is about 100psi

To isolate the area of possible air leak:

Step 1: First check the operation of the chemical probe only. That is by-pass the Transcal tank. If this will transfer water at a minimum of 30lt/min then this part of the system is okay.
If not check for air leaks at:

- Cam lever fitting at the probe.
- Hose fittings.
- Venturi – the venturi can suck air (less vacuum) where the black drop-pipe connects to the orange venturi.
- The venturi may also suck air where the 'lay flat' hose joins the bottom of the black PVC drop pipe.

Step 2: Check Transcal tank. If the probe is working successfully but the Transcal tank system won't work then the air leak areas to check are:

- The Tank lid. This lid may tighten against the metal bracket above the tank and not the tank itself. Also the top of the tank needs to be clean and smooth for the lid to seal. Also check the lid for cracks and condition of the seal.
- Fitting at the base of the Transcal tank.
- Any hoses and connectors.

Step 3: If probe works correctly and Transcal tank works correctly when using suction probe but envirodrum will not operate, check for air leaks in envirodrum fitting (this must be thoroughly cleaned after each use) and check interior pipes in the envirodrum for air leaks or damage.

IN SUMMARY:
First: Check the flow of water into venturi.

Then:
1. Check the probe only.
2. Check the probe and Transcal.
3. Check Transcal and envirodrum section.

- Tests must be done with water because the speed of the transfer is affected by the increased viscosity of the chemical.
- The old foot valve at the bottom of the drop pipe caused some problems, and this has been replaced by 'lay flat' tube on all new sprayers. GoldAcres can supply a service kit to retro-fit old sprayers to the new 'lay flat' tube.
- When fitting lay flat do not distort the drop pipe when tightening clamp or an air leak can develop. It will not be possible to fit the back nut to the venturi when lay flat is fitted.

Do not remove drop pipe from venturi except for resealing.

The Transcal tank has deformed and sucked in?

Common causes	Common solutions
Residual vacuum left in tank when it is not in use. This is especially important when spraying in warm weather or when the sprayer is parked overnight.	When use of the Transcal is complete, make sure the venturi probe tap is turned off and let the tank vent.

The sight tube on the Transcal is not giving a true indication of the tank level?

Common causes	Common solutions
Probe or envirodrum couplers turned on	Ensure the tap on the Probe or Envirodrum coupler is turned off before evaluating the tank level.

Boom

Inner and outer wing are not inline with each other when the boom is unfolded?	
Common causes	**Common solutions**
Boom cables are not adjusted correctly	Adjust boom cables to realign booms

Booms will not fully fold to the boom rests?	
Common causes	**Common solutions**
Insufficient lubrication	Lubricate all boom pivots
Fold cylinder mounts have moved	Adjust fold cylinder mounts

Booms unfold unevenly?	
Common causes	**Common solutions**
Air trapped in the phasing cylinders	Unfold booms completely and hold hydraulic lever for a few seconds. This will purge any air out of the phasing cylinder

Outer boom does not line up with the inner wing when unfolded?	
Common causes	**Common solutions**
Boom adjustment	Fold the boom out and note the position the outer boom is in. Fold the boom in to transport position and note position outer boom is in. Follow the table below to adjust boom so it sits level in the out (work) position and to have the bottom chords sitting parallel in the folded (transport) position.

Booms are showing signs of bending components and welds cracking?	
Common causes	**Common solutions**
Folding or unfolding of booms is too fast	Reduce the hydraulic flow to the folding cylinders
Folding or unfolding of booms while the sprayer is still moving	Do not fold or unfold the boom while the sprayer is still moving
Tilt operation	Tilt operation should be kept to a minimum. If the tilt operation is too fast, reduce the oil flow.

Boom adjustment table

Outer wing position (out)	Outer wing position (folded)	Top pivot shim adjustment	Bottom pivot shim adjustment
Up	Up	Nil	Remove shims
Up	Down	Add shims	Nil
Level	Up	Remove shims	Remove shims
Down	Down	Nil	Add shims
Down	Up	Remove shims	Nil
Level	Down	Add	Add

Chapter 10

LUBRICATION & MAINTENANCE

Maintenance schedule

Frequency	Maintenance tasks
8hr	Check pump oil level & condition
8hr	Check tyre pressure
8hr	Check wheel nuts are torqued correctly to 320 ft/lb
8hr	Grease tilt arm pivot pins
8hr	Grease cable drum bearing block pivots
8hr	Clean pressure and suction filters if blocked
8hr	Clean airbag and foam marker compressor air filter
8hr	Clean direct chemical injection air filter *(where fitted)*
8hr	Grease pump PTO shaft universal joint nipples
25hr	Grease cable adjuster pivots
25hr	Grease wheel bearings
50hr	Grease pump PTO shaft safety cover
50hr	Grease boom mount rose ends
50hr	Grease all delta links on centre section
50hr	Grease paralift arm rose ends
50hr	Towing eye
50hr	Grease boom lifting cylinders
150hr	Check wheel bearings for sideways movement
300 - 350hrs	Change pump oil
3 months	Check bolts on axle bearing caps
3 months	Check the condition of the brakes extensively
3 months	Grease jack
3 months	Grease braked axle cam shaft bearing lightly
Yearly	Clean wheel bearings, inspect, re-grease and set rolling torque
Yearly	Carry out a complete decontamination of the sprayer
Yearly	Check pump air accumulator pressure is at an equal pressure to the spraying pressure

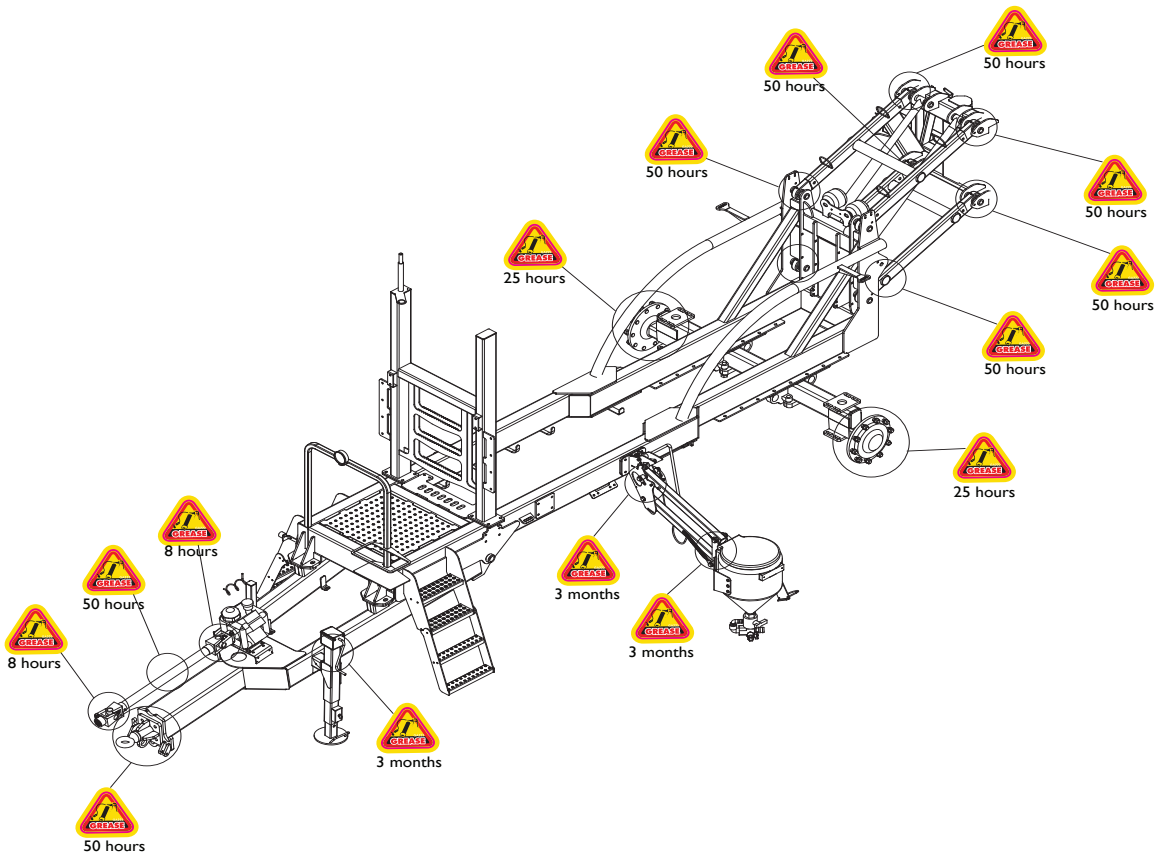
Lubrication

Goldacres recommend that a quality multi purpose grease should be used when lubricating your equipment.

A SAE 30W40 engine oil should be used in the diaphragm pump.

The pictures below outline key lubrication points. Please note the pictures do not show hydraulic cylinders, all hydraulic cylinders (excluding wing tilt cylinder) have grease points at the clevis'.

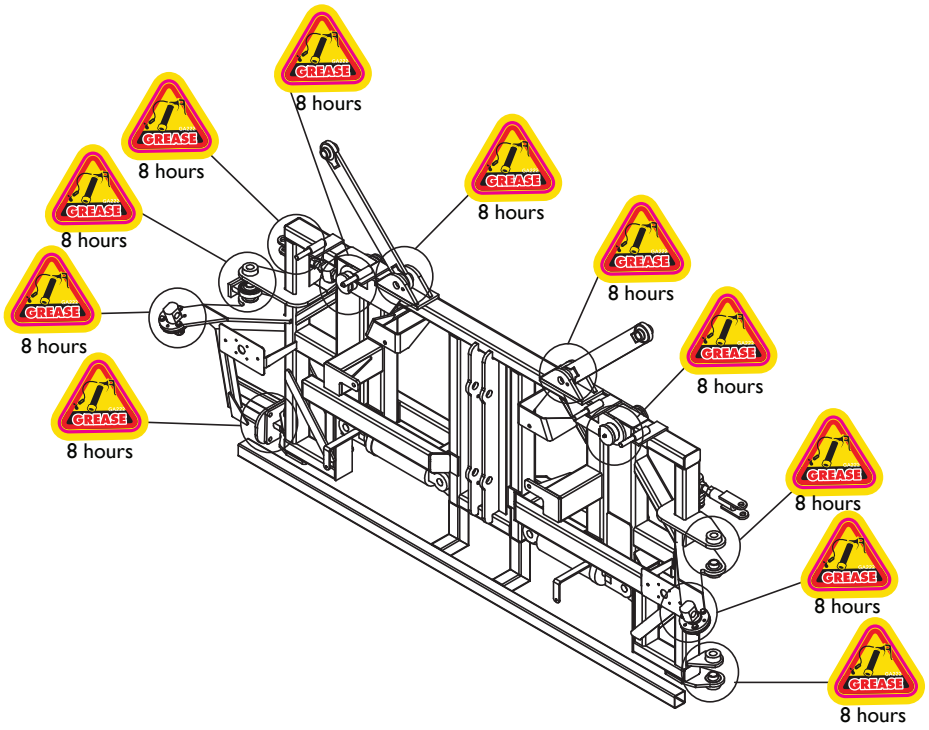
Chassis and PTO shaft grease points



Location	Grease Interval
PTO Shaft universal joints	8 hourly
Wheel bearings	25 hourly
Hitch	50 hourly
PTO telescopic shaft	50 hourly
Paralift arm rose ends	50 hourly
Boom lift cylinders	50 hourly
Jack	3 monthly
Induction hopper pivots	3 monthly

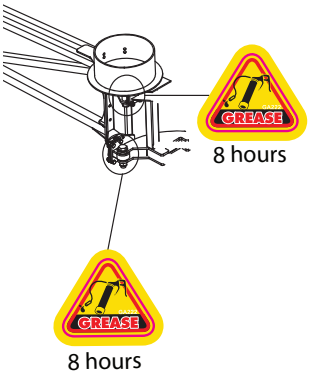
NOTE: *The drawing above does not show hydraulic cylinders. Each hydraulic cylinder has a grease nipple located at each end. These points should be greased on a 50 hourly basis.*

Boom centre section grease points



Location	Grease Interval
Cable adjuster pivots	8 hourly
Cable drum bearing block pivots	8 hourly
Tilt arm pivot pins	8 hourly
Boom mount rose ends	8 hourly
Delta links	8 hourly

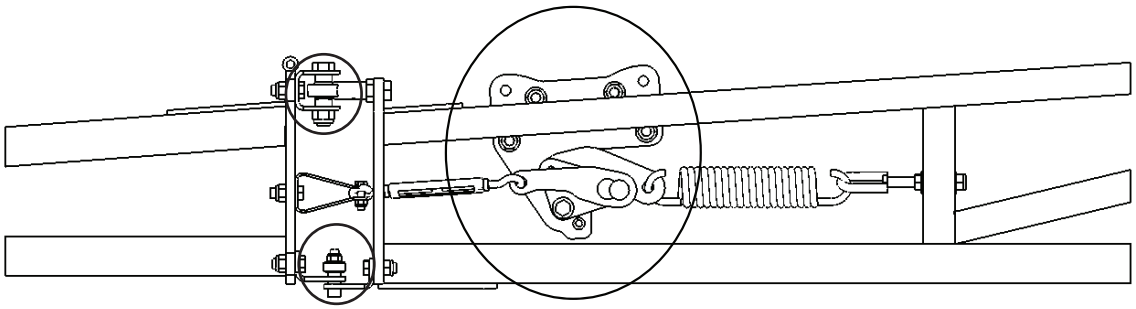
Cable drum grease points



Location	Grease Interval
Cable adjuster pivots	8 hourly
Cable drum bearing block pivots	8 hourly
Tilt arm pivot pins	8 hourly
Cable adjuster pivots	25 hourly
Boom mount rose ends	50 hourly
Delta links	50 hourly

NOTE: *The drawing above does not show hydraulic cylinders. Each hydraulic cylinder has a grease nipple located at each end. These points should be greased on a 50 hourly basis.*

3D breakaway lubrication points



Location	Oil Interval
Pivot points on 3D breakaway	8 hourly

Maintenance

Pressure relief valve

The pressure relief valve provides relief when the pressure exceeds a pre-determined value. Altering the adjusting stem will affect the setting at which the relief valve will come into operation. Turning the stem clockwise will increase the pressure relief setting. Goldacres pre-sets the pressure to approximately 110psi and this should not be altered. To check or alter this setting, turn the pump 'OFF' and turn relief valve counter clockwise. Turn the solenoids 'OFF', and then close all control manifold ball valves so that all flow passes through the relief valve. Run the pump at maximum operating speed (540 RPM) and slowly turn the relief valve clockwise until the pressure is achieved. Tighten the nut on the adjusting stem so that this setting is maintained. If the relief setting is too low, excessive flow will be allowed to bypass back to the tank and it will limit the maximum obtainable pressure.

Pump

8 Hours

Check pump oil level and condition:

50 Hrs

Pump oil should be changed after the first of 50 hours of operation.

Pump oil level should be between the two level makers on the oil reservoir. If the oil level continually gets low or is turning milky, there is possibly a split in a diaphragm. The oil will need to be drained and all the diaphragms replaced. Use SAE 30W40 oil. Rotate the pump manually (by hand) to remove any air locks while filling. Do not over fill.

Grease pump PTO shaft: Shaft universal nipples and telescope nipple must be greased every 8 Hrs. The cover must be greased every 40 Hrs to ensure it spins freely on the shaft.

300-350 Hrs

Change Pump oil: Pump oil should be changed very 300-350 Hrs. Use SAE 30W40 oil. On an RO160 or RO320 pump the drain plug in between the two pump mounts underneath the pump. An RO250 has the drain plug on the drive shaft face below the shaft.

Seasonally

Check pump air accumulator (where fitted) pressure (approx 110psi) the air pressure in the air accumulator must be maintained to the correct pressure. If the accumulator constantly looses pressure, the valve or diaphragm may need replacing. To recharge the accumulator, charge it to 690 psi then run the pump at normal operating RPM. Looking at the pressure gauge, release some pressure until there is as little pulsation as possible. This will ensure a very even and constant pressure delivery.

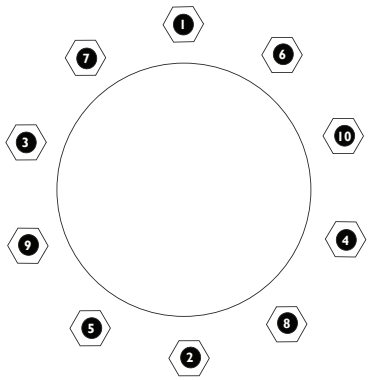
Chassis, wheels, tyres and axles

8 Hrs

Check tyre pressure: It is very important to maintain correct tyre pressures to optimize sprayer stability and the load rating. To determine the required tyre pressure, refer to the tyre specification chart in the general information section of the operator manual. If the tyre has a constant leak, the valve may be loose or need replacing, or the tyre may have a puncher.

Check wheel nuts are torqued correctly:

Wheel nuts must be checked every 8 Hrs and re-torqued to 320 ft lb if required. Follow the sequence below to ensure an even torque distribution.



25 Hrs

Grease wheel bearings: Grease is applied to the ADR axle via a grease nipple on the front of the hub.

150 Hrs

Check wheel bearings for sideways movement: To check the wheel bearings for free play, jack up that side of the sprayer until the wheel can spin freely. Rock the wheel from side to side. If the is any movement the bearings will need to be tightened or replaced.

3 months

Grease jack: There are two grease nipples on the Prairie Evolution jack. One on the winding mechanism and one on the jack swing pivot. Both need to be greased every three months to ensure easy operation.

Check bolts on axle bearing caps:
Bearing cap must be regularly checked and tightened if required. If dust is able to enter the axle bearings it could cause the bearings to fail. If the gasket on the dust cap is damaged or not sealing properly it must be replaced.

Checking brake condition and servicing of braked axles:

Brake maintenance and adjustments
The brakes should be tested before using for the first time and after the first laden journey.

Check the actuator and return spring mountings, check the actuator stroke and return travel and check they operate and release correctly.

Tighten the screws and nuts (covers, fulcrum, etc), check the cotter pins, pins, circlips, etc.

Check for hydraulic fluid and air leaks.

Checking brake clearance and wear

Check and test the brakes before intensive use and every 3 months:

Check the brake wear and the clearance between the brake linings and the drum visually through the inspection hole in the dust cover at the rear of the drum. It is probable that the linings are worn when the actuator travel has increased significantly.

Check the thickness of the brake linings (minimum allowable 5mm)

The brake shoes should be replaced as soon as the minimum lining thickness is reached.

Check that the brakes are clean. Clean them if necessary. Do not clean with compressed air.

Lubricate brake cam shaft bearings with grease, lightly to avoid grease deposits on the brake linings and drums.

Adjusting brakes with fixed levers
Take up the slack when the actuator stroke reaches about two thirds of the maximum travel.

To take up the slack, turn the lever by one or more splines, ensuring that the brakes are not touching when released (to prevent overheating the brakes).

Never change the linkage position for the actuator on the lever without authorization from the vehicle manufacturer as the vehicle will have been tested with the actuator at this position (the brake operating levers have several holes, always use the original hole).

For braking systems with a yoke, the yoke must remain parallel with the axle especially when the brakes are fully applied. This means that the stroke of the levers on the brakes at each side must be identical.

Adjusting brakes with adjustable levers
Take up the slack when the actuator stroke reaches about two thirds of the maximum stroke. To take up the slack, turn the adjustment screw on the lever to adjust the relative position of the cam and the lever.

NB. The actuator brakes by pushing the lever to turn it in a particular direction. The screw must be adjusted so that the cam moves in this direction to take up the slack.

The direction in which the screw must be turned depends on the configuration.

Ensure that the brakes are not touching when released (to prevent overheating the brakes).

Never change the linkage position for the actuator on the lever without authorization from the vehicle manufacturer as the vehicle will have been tested with the actuator at this position (the brake operating levers have several holes, always use the original hole)

Seasonally
Clean wheel bearings, inspect, re-grease and set bearing pre-load:

If the axle bearings have become worn or damaged and need replacing, the following procedure should be followed. Remove the wheel as per instructions.

Remove the bolts from the bearing dust cap and clean out as much grease as possible.

Remove the split pin and castle nut and washer.

Slide the outer bearing and hub off the axle. Bearing puller may be required. Remove the inner bearing.

If the seal is also to be replaced, remove it as well.

Clean all existing grease from the axle and the hub and wash in solvent.

Insert new rear seal.

Pack the two new bearings with grease prior to fitting on the axle. Ensure grease has penetrated completely through the bearing.

Slide new inner bearing onto shaft.

Place hub back onto axle and fill cavity with grease.

Insert new outer bearing.

Fit washer and do nut up firm.

Perform the pre-load test on the hub to determine how tight to set the nut.

Grease the hub until grease emerges from the seal.

The pre-load needs to be 12kg. This test is performed by tying string or rope to a stud and wrapping it around the outside of all the studs. With a set of tension scales connected to the rope, pull the scales. The hub should begin to rotate at 12kg. Tighten or loosen the nut to achieve the required setting. Fit split pin and bolt the bearing dust cap in place.

Removing a wheel from the sprayer:

- The sprayer must be hitched to the appropriate towing vehicle.
- The engine of the towing vehicle must be turned off and the park brake applied.
- Chock the wheel(s) that is/are not to be removed with an appropriate item to prevent the sprayer from moving.
- With a wheel nut wrench, loosen all the wheel nuts on the wheel that you wish to remove (Do not remove wheel nuts until the tyre is off the ground).
- Place a jack on level, firm and stable foundation under the sprayer axle and between the two axle bolts near the wheel to be removed. The jack may need to have a large piece of timber or steel placed under it so that the jack will not sink.
- Use the jack to raise the sprayer axle such that the wheel is off the ground.
- Place an auxiliary jack block under the sprayer so that if the jack fails the sprayer will not fall.
- Remove all wheel nuts and remove wheel from sprayer. Be careful that the wheel does not fall on any person and cause bodily harm.
- Ensure that the sprayer is stable when being left for an extended period of time.

Replacing a wheel onto the sprayer:

- Make sure the sprayer is stable when supported with the jack and the jack block in place and hitched to the appropriate towing vehicle.
- Make sure the wheel is in a satisfactory condition to use and that the tyre is inflated to the correct tyre pressure.
- Clean the surface between the wheel and the hub.
- Carefully lift repaired/new wheel up so that the holes in the rim centre go over the wheel studs on the wheel hub.
- Carefully put the wheel nuts on and tighten them finger tight.
- With a wheel nut wrench tighten wheel nuts alternately and evenly to a torque rating of 320ft lb.
- Remove the jack block from under the sprayer.
- Carefully lower the sprayer slowly with the jack until the tyre touches the ground.
- Retighten the wheel nuts to the required torque rating.
- Let the jack completely down so that all weight is taken off the jack and remove jack (and any supports placed under the jack) from under the sprayer.
- Remove wheel chocks that were placed to the front and rear of the opposite wheel (to prevent it from moving).
- Check tyre pressure before moving sprayer.
- Retighten wheel nuts to the required torque rating: One hour after fitting the tyre, before filling main spray tank, after the first tank load.

Booms

8 Hrs
Grease tilt arm pivot pins.
Grease cable drum bearing block pivots.

25 Hrs
Grease cable adjuster pivots:

50 Hrs
Grease boom mount rose ends.
Grease all delta links on centre section.
Grease paralift arm rose ends.

Adjusting boom ride height switch on paralift booms:
The ride height switch is used to adjust the minimum boom height. The switch is located on the bottom of the left hand side of the boom paralift.

To adjust the switch:

1. Loosen the two adjustment knobs on ride height bracket
2. By lowering the switch the minimum boom height is increased.
3. Each notch gives approximately 100mm of boom height adjustment.
4. Once adjusted tighten knobs.

Filters

WARNING: Always wear gloves if removing or cleaning filters.

If in-line filters have been fitted to replace nozzle filters, always unfold and lower the boom before attempting to unscrew any filter.

It is essential to maintain all filters and filter screens in good condition. Filter screens that are not regularly cleaned can severely impede liquid flow and delivery pressure. If the screens are in anyway damaged, they can allow foreign material into the pumping system which can result in damage to the pump, solenoids, valves and cause blockages in nozzle tips. Also, if the screens are not properly fitted, air can enter the pumping lines which will reduce pump performance.

Filter screens are best cleaned with a soft brush in clean water or by compressed air after washing.

WARNING: Read and heed the chemical label regarding protective clothing when cleaning any filter.

To clean the suction filter:

1. Wear gloves and other recommended protective clothing.
2. Ensure that the pump is turned 'OFF' and the pump three-way ball valve is turned 'OFF' to prevent flow to the filter.
3. Carefully unscrew filter nut and remove bowl.
4. Remove screen and clean.
5. Check for damage to screen, bowl, body and o-ring.
6. Place screen back in position.
7. Make sure o-ring is in position for proper seal.
8. Replace bowl and screw nut on.
9. Do not over-tighten nut.

To clean pressure filter:

1. Wear gloves and other recommended protective clothing.
2. Ensure that the pump suction is turned 'OFF' and the pump 3-way ball valve is turned 'OFF' to prevent flow to the filter and pump.
3. Ensure that the supermix agitator ball valve is 'OPEN' (will release any residual pressure. Also remove small cap on bottom of pressure filter to relieve pressure)
4. Carefully unscrew filter nut and remove

Hydraulic fold cylinders

If the sides of the boom do not fold together so that they become out of line, the hydraulic rams will need to be re-phased.

To do this:
Open the boom right out and continue to hold the control lever in that position for several seconds until the rams are synchronised. The air bleed cap should also be loosened from time to time to remove air from the system.

We recommend that periodical re-phasing of the rams is good practice, as this not only ensures that the rams are working in tandem, but that any air that may be trapped in the rams is also forced out of the hydraulic lines.

Chapter 11

OPTIONAL ACCESSORIES

General Information

The following pages provide information on Goldacres optional accessories available on this equipment.

Please note: These options may not be fitted to your sprayer unless ordered.

Chemical induction probe

Overview

A simple method of transferring chemical into the sprayer tank is via the chemical probe. The chemical probe enables the chemicals to be transferred with minimal exposure to the operator. The probe is used in conjunction with the Venturi filler (located on the top of the tank) which creates the required suction on the pressure side of the pump.

The viscosity of the chemical being transferred will affect the rate of suction flow and hence the amount of time required to transfer the chemical. Water and air have low viscosities whereas molasses is an example of a highly viscous liquid. The higher the viscosity of the liquid, the longer it takes to transfer via the chemical probe. If the viscosity of a chemical is such that it takes too long to transfer, dilute the chemical with water, which will reduce the viscosity, and then transfer the solution.

The chemical should be transferred after about 20% to 50% of the required water quantity has been added to the sprayer tank. This will ensure that agitation takes place when the remaining water is added.

The end of the probe is not flat so that the probe, when placed flat against the bottom of the container, will not restrict the flow of chemical.

Key Features

Operation

WARNING: It is critical that the chemical probe venturi continues to operate for a minimum of 30 seconds following use. This will ensure that no chemical is left in the line prior to the probe being disconnected.

To operate the chemical probe:

1. Add 20 percent of the tank's volume of clean water to the main spray tank. Initially there needs to be a sufficient amount of water in the tank in order for the pump delivery to create the venturi effect via the venturi filler.
2. Ensure that the red handle on the pump 3-way valve is pointing towards the suction hose coming from the main tank sump.
3. Connect probe via cam lever fitting. Close all ball valves and set pressure to 110psi.
4. 'OPEN' the venturi and agitator valves.
5. Close the bypass and induction hopper valves.
6. Operate the pump at the lowest speed necessary to generate at least 85 psi delivery pressure (as displayed on the pressure gauge mounted on the side pod). Do not run faster than 540 RPM. The higher the pump delivery pressure, the greater the venturi suction and the quicker the probe will transfer the chemical. The delivery pressure should not exceed 100 psi as determined by the pressure relief valve setting.
7. Place probe in chemical.
8. 'OPEN' the valve on the probe.
9. The chemical should be now transferring to the sprayer tank via the venturi filler.
10. When all of the chemical has been transferred, rinse the chemical container with water and transfer the rinsate to the sprayer tank via the probe. This should ensure that the entire chemical is transferred and that the probe, venturi filler and connecting suction hose are cleaned. Induct clean water to rinse probe vacuum hose.
11. When finished, 'CLOSE' the valve on the probe and the venturi valve, 'OPEN' the bypass valve, keep the agitator valve 'OPEN' and disconnect the probe. Once chemical has been transferred into the main spray tank the sprayer should always be agitating until spraying begins.

Chemical induction hopper

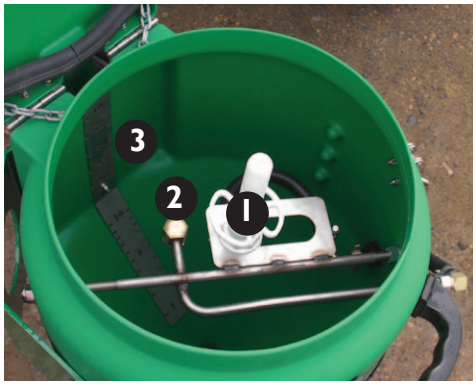
Overview

The Chemical Induction Hopper is an alternative method of transferring chemical into the main spray tank. The hopper can be lowered to a more convenient height for adding chemicals. The chemical can either be in liquid form or granular form and once in the hopper the chemical can then be easily transferred into the main spray tank. The hopper facilitates drum rinsing with fresh water and the hopper itself can be rinsed and all rinsate then transferred into the tank.

The hopper transfers the chemical via venturi effect. Water from the main spray tank is pumped under the bottom of the hopper where it passes through a venturi fitting under the hopper. This causes a suction effect and when the bottom of the hopper is open (via the hopper tank valve) the tank contents are drawn into the flow from the pump passing under the hopper and then transferred into the middle of the main spray tank. This eliminates chemical attack resulting from high concentrations of chemical coming into contact with spray components.

NOTE: The level indicator should be used as a guide only.

Key Features



Reference Number	Function
1	Drum rinse nozzle
2	Tank rinse nozzle
3	Level indicator 40L
4	Drain tap
5	Hopper tank ball valve
6	Drum rinse nozzle

Operation

To operate the induction hopper:

1. Add at least 500 litres of clean water to the main spray tank. Initially there needs to be a sufficient amount of water in the tank in order for the pump delivery to create the venturi effect via the venturi fitting. This will also ensure that agitation takes place when the remaining water is added.
2. Lower the hopper for convenience. (Check that the delivery hose to the hopper is not restricted or kinked).
3. Ensure that the red handle on the pump three-way ball valve is pointing towards the main tank sump.
4. Open the induction hopper ball valve and (if required) the supermix agitator ball valve.
5. Ensure the bypass line ball valve and the chemical probe ball valves are closed.
6. Operate the pump at the lowest speed necessary to generate at least 70-80 psi delivery pressure (as displayed on the sprayer pressure gauge). Do not run faster than 540 RPM.

NOTE: The higher the pump delivery pressure, the greater the venturi suction and the quicker the hopper will transfer the chemical. The delivery pressure should not exceed 110 psi as determined by the pressure relief valve setting.

7. The wash down hose is also useful for ensuring all chemical is clear of the hopper (only available when fresh water coming into the fill station)
8. Put the required amount of chemical into the hopper (liquid or granular). Wear the necessary protective clothing and use the required safety equipment to avoid exposure to chemicals.
9. Open the hopper tank ball valve at the bottom of the hopper by turning the yellow handle up. The chemical should be now transferring to the main spray tank.
10. Rinse all chemical drums and the hopper as per the rinsing instructions.

When finished using the hopper:

- Close the hopper tank ball valve at the bottom of the hopper by turning the yellow handle so that it is horizontal.
- Turn the bypass valve 'ON'.
- Turn the induction hopper valve 'OFF'.
- Ensure that the agitator valve is 'ON'. The sprayer should always be agitating until spraying begins.
- Raise the hopper to its transport position and replace the retaining pin in the mechanism.

Rinsing

To rinse the Induction Hopper and chemical drums with fresh water from the external water delivery station:

1. Lower the hopper. (Check that the delivery hose to the hopper is not restricted or kinked).
2. Make sure that all valves on the EZ control external water delivery station are 'OFF'.
3. Make sure that the Hopper Rinse valve on the top of the hopper is 'OFF'.
4. Connect the fresh water fill hose to the quick-fill coupling.
5. Operate the fresh water pumping system between 70 and 100 psi.
6. Turn the Induction Hopper valve on the Pressure delivery station 'ON'.
7. Open the hopper tank valve at the bottom of the hopper by turning the yellow handle 'UP'.
8. Ensure that the hopper drain tap, also located at the bottom of the hopper, remains 'CLOSED'.
9. To rinse a drum, push the drum over the rinsing nozzle located in the top of the hopper.
10. To rinse the hopper, turn the Hopper Rinse valve on the top of the hopper 'ON'. Close this valve when the hopper has been rinsed.

When the hopper is empty:

- Remove any chemical drums that have been rinsed from the hopper.

Vortex chemical induction hopper

Overview

The Chemical Induction Hopper is an alternative method of transferring chemical into the main spray tank. The hopper can be lowered to a more convenient height for adding chemicals. The chemical can either be in liquid form or granular form and once in the hopper the chemical can then be easily transferred into the main spray tank. The hopper facilitates drum rinsing with fresh water and the hopper itself can be rinsed and all rinsate then transferred into the tank.

The hopper transfers the chemical via venturi effect. Water from the main spray tank is pumped under the bottom of the hopper where it passes through a venturi fitting under the hopper. This causes a suction effect and when the bottom of the hopper is open (via the hopper tank valve) the tank contents are drawn into the flow from the pump passing under the hopper and then transferred into the middle of the main spray tank. This eliminates chemical attack resulting from high concentrations of chemical coming into contact with spray components.

NOTE: The level indicator should be used as a guide only.

Key Features

Reference Number	Function
1	Rinse tap
2	Tank rinse nozzle
3	Level indicator 60L
4	Drain tap

Reference Number	Function
5	Hopper tank ball valve
6	Drum rinse nozzle
7	Fresh water mixing valve
8	Anti aeration device

Operation

To operate the induction hopper:

1. Add at least 500 litres of clean water to the main spray tank. Initially there needs to be a sufficient amount of water in the tank in order for the pump delivery to create the venturi effect via the venturi fitting. This will also ensure that agitation takes place when the remaining water is added.
2. Lower the hopper for convenience. (Check that the delivery hose to the hopper is not restricted or kinked).
3. Ensure that the red handle on the pump three-way ball valve is pointing towards the main tank sump.
4. Open the induction hopper ball valve and (if required) the supermix agitator ball valve.
5. Ensure the bypass line ball valve and the chemical probe ball valves are closed.
6. Operate the pump at the lowest speed necessary to generate at least 70-80 psi delivery pressure (as displayed on the sprayer pressure gauge). Do not run faster than 540 RPM.

NOTE: The higher the pump delivery pressure, the greater the venturi suction and the quicker the hopper will transfer the chemical. The delivery pressure should not exceed 110 psi as determined by the pressure relief valve setting.

7. The wash down hose is also useful for ensuring all chemical is clear of the hopper (only available when fresh water coming into the fill station)
8. Put the required amount of chemical into the hopper (liquid or granular). Wear the necessary protective clothing and use the required safety equipment to avoid exposure to chemicals.
9. Open the hopper tank ball valve at the bottom of the hopper by turning the yellow handle up. The chemical should be now transferring to the main spray tank.
10. Rinse all chemical drums and the hopper as per the rinsing instructions.

When finished using the hopper:

- Close the hopper tank ball valve at the bottom of the hopper by turning the yellow handle so that it is horizontal.
- Turn the bypass valve 'ON'.
- Turn the induction hopper valve 'OFF'.
- Ensure that the agitator valve is 'ON'. The sprayer should always be agitating until spraying begins.
- Raise the hopper to its transport position and replace the retaining pin in the mechanism.

Rinsing

To rinse the Induction Hopper and chemical drums with fresh water from the external water delivery station:

1. Lower the hopper. (Check that the delivery hose to the hopper is not restricted or kinked).
2. Make sure that all valves on the EZ control external water delivery station are 'OFF'.
3. Make sure that the Hopper Rinse valve on the top of the hopper is 'OFF'.
4. Connect the fresh water fill hose to the quick-fill coupling.
5. Operate the fresh water pumping system between 70 and 100 psi.
6. Turn the Induction Hopper valve on the Pressure delivery station 'ON'.
7. Open the hopper tank valve at the bottom of the hopper by turning the yellow handle 'UP'.
8. Ensure that the hopper drain tap, also located at the bottom of the hopper, remains 'CLOSED'.
9. To rinse a drum, push the drum over the rinsing nozzle located in the top of the hopper.
10. To rinse the hopper, turn the Hopper Rinse valve on the top of the hopper 'ON'. Close this valve when the hopper has been rinsed.

When the hopper is empty:

- Remove any chemical drums that have been rinsed from the hopper.

- Turn the hopper tank valve at the bottom of the hopper 'OFF' by turning the yellow handle 'UP'.
- Turn the Induction hopper valve on the EZ control Pressure Delivery station 'OFF'.

Drain the hopper of any remaining liquid using the hopper drain tap at the bottom of the hopper.

The hopper can be rinsed and the rinsate emptied through the hopper drain ball valve rather than transferred into the main spray tank.

To do this:

1. Ensure the fresh water filling supply pump system is operating.
2. Open the hopper rinse valve on the top of the hopper.
3. 'OPEN' the hopper tank ball valve at the bottom of the hopper by turning up the yellow handle so that it is vertical, removing the rinsate from the hopper.
4. Open the hopper drain valve.

CAUTION: Do not have the sprayer pump operating.

NOTE:

- Take proper safety precautions to avoid any contact with rinsate when draining, as it may contain chemical residue.
- Be careful as to where the rinsate is being deposited as it may contain chemical residue.
- This procedure will not rinse the hose from the bottom of the hopper to the main tank.

Transcal

Overview

The Transcal volumetric measuring system is designed to provide a measuring facility without the need for an auxiliary pump and flowmeter. When used in conjunction with the venturi chemical probe, or micromatic fitting, the required volume of chemical can be transferred out of the chemical container into the Transcal tank.

The chemical can then be transferred into the main spray tank via venturi suction by simply turning a valve and there is no undiluted chemical coming into contact with any pump or complex components. The system can be used with most types of chemical containers (including the envirodrum closed transfer system).

NOTE: The calibration markings on the Transcal tank should be used as a guide only.

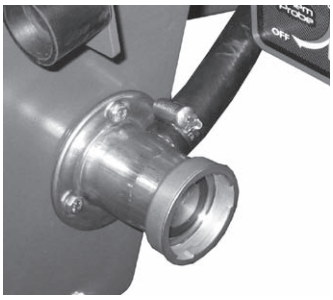
The Transcal system requires a vacuum to operate. Any air leaks in the tank lid, hoses or cam lever seals will affect the performance or cause total failure to operate.

WARNING: Do not fill Transcal tank past the 45 litre mark.

WARNING: Do not use the Transcal tank to store chemicals when spraying.

WARNING: Do not level tank under vacuum.

Key Features



Operation

1. Remove the cam lever plug and connect the chemical probe line or the Micromatic coupler to the cam lever fitting.
2. Ensure that the yellow T-handle on the Transcal station is aligned to 'FILL'.
3. Add approximately 10% of the total volume of clean water to the main spray tank.
4. Ensure that the red handle on the pump 3-way valve is pointing towards the suction hose coming from the main tank sump. Close all ball valves and set pressure to 110psi.
5. 'OPEN' the agitator and venturi valves on the pressure delivery station.
6. 'CLOSE' the bypass and induction hopper valves on the pressure delivery station.
7. 'OPEN' the chemical probe valve at the Transcal station.
8. Operate the pump at the lowest speed necessary to generate 85 psi delivery pressure (as displayed on the manifold pressure gauge). Do not run faster than 540 RPM. The higher the pump delivery pressure, the greater the venturi suction and the quicker the probe will transfer the chemical. The delivery pressure should not exceed 110 psi as determined by the pressure relief valve setting.
9. Place the probe in the chemical drum and open the valve on the chemical probe or connect the Micromatic fitting to the outlet on the envirodrum and push the handle down so that it locks into position and opens the valve on the envirodrum.
10. The chemical should now be transferring into the Transcal tank.
11. When the required amount of chemical has been transferred, 'CLOSE' the valve on the chemical probe. Remove it from the chemical drum and then 'OPEN' the valve on the chemical probe again. This will drain residual chemical from hose.

If chemical has been transferred from an envirodrum, push the handle on the Micromatic coupling down slightly and then up. This will make the handle lift up and close the valve on the envirodrum. This should be done when doing successive fills into the Transcal tank. When finished transferring chemical, turn the fitting in order to release it from the envirodrum.

What to do if the Transcal tank is overfilled

CAUTION: Ensure that the appropriate protective clothing is worn, as per the chemical label.

In the event of over-filling the Transcal tank, a small piece of supplied black 25mm hose can be fitted to the ball valve on the bottom of the Transcal to drain away any excess chemical. To perform this you:

1. Turn the Transcal 'T' handle on the Transcal station to 'OFF'.
2. Close the venturi valve on the EZ control pressure delivery station.
3. With the Transcal 'T' handle on the Transcal station to 'OFF', and wearing the appropriate safety clothing, undo the cam lever fittings on the ball valve on the bottom of the Transcal station and remove the black 25mm hose. This is behind the Transcal station cover and can be accessed from underneath.
4. Attach the short length of black drain hose via the cam lever connection.
5. Place an appropriate container under the drain hose.
6. Turn the 'T' handle on the Transcal station to 'EMPTY'.
7. After draining the required amount of chemical, remove the drain hose, replace the vacuum supply hose and resume operating the Transcal. The raw chemical should be returned to the original container.

Transferring chemical from the Transcal tank to the main tank

Once the required amount of chemical is in the Transcal tank, transfer it into the sprayer tank:

1. Ensure that the venturi valve on the pressure delivery station is 'ON'.
2. The Transcal tank needs to be vented when emptying. Remove the chemical probe from the container and open the valve on the chemical probe, or open the Micromatic fitting.
3. Turn the 'T' handle on the Transcal station to 'EMPTY'.
4. The chemical should now transfer into the main spray tank.

When finished:

1. The Transcal tank and probe or Micromatic coupler should be thoroughly rinsed (see rinsing instructions on the pages following).
2. Turn the 'T' handle on the Transcal station 'OFF'.
3. Turn the valve on the probe 'OFF'.
4. Turn the venturi valve 'OFF'.
5. Turn the bypass valve 'ON'.
6. Ensure that the agitator valve is 'ON'.
7. Keep the agitator valve 'ON' until spraying begins.
8. Disconnect the probe or envirodrum line and replace the cam plug in the cam lever fitting.

Transferring chemical without measuring

The chemical can be transferred from the chemical container into the main spray tank (bypassing the Transcal tank) without the chemical being measured (i.e. by emptying full containers). This will reduce the time taken to transfer the chemical.

To do this you:

1. Release the cam lever fitting from the rear of the Transcal station and connect either the probe or the envirodrum line.
2. Place the probe in the chemical drum and open the ball valve on the chemical probe, or connect to the envirodrum and engage the Micromatic handle.
3. Turn the venturi valve on the pressure delivery station 'ON' 85 psi (see previous instructions).
4. The chemical will now transfer from the chemical drum into the main sprayer, bypassing the Transcal.
5. When the required amount of chemical has been transferred, close the ball valve on the chemical probe and remove it from the chemical drum or release the Micromatic fitting.
6. When finished, the probe or Micromatic coupler should be thoroughly rinsed (see following instructions).
7. Turn the venturi valve 'OFF'.
8. Turn the bypass valve 'ON'.
9. Ensure that the agitator valve is 'ON'. The sprayer agitator should be maintained until spraying begins.
10. Disconnect the probe or envirodrum line from the sprayer and re-attach black suction hose to the rear of Transcal station.

Rinsing

Rinse the chemical probe line:

If you're wanting to rinse the Transcal lines after using the chemical probe.

1. Fill a suitable container with fresh water (and any applicable decontaminating agent), at least 50 litres of fresh water should be sucked through for sufficient cleaning.
2. Remove the cam lever plug and connect the chemical probe line to the cam lever socket at the Transcal station.
3. Turn Chemical Probe valve to 'ON'.
4. Place the probe into the container with fresh water and open the valve on the chemical probe.
5. Turn the yellow 'T' 'handle on the Transcal station to 'EMPTY''.
6. Operate the Transcal venturi around 85psi.
7. The fresh water should now transfer to the Transcal tank and then into the main spray tank cleaning the lines from the chemical probe to the Transcal tank and to the main spray tank.

When finished:

- Turn the valve on the chemical probe line 'OFF'.
- Turn the chemical probe valve 'OFF'.
- Turn the yellow 'T' handle 'OFF'.
- Turn the venturi valve 'OFF'.
- Ensure that the agitator valve is 'ON'.

Disconnect the line from the Transcal tank to the probe from the cam lever fitting and replace the cam plug.

Rinsing the envirodrum line

To rinse the Transcal lines after using the Micromatic coupler.

1. Connect the Micromatic coupler to the Micromatic rinsing socket.
2. Connect the envirodrum suction line to the cam lever socket on the sprayer.
3. Turn Chemical Probe valve to 'ON'.
4. Open the 'Envirorum Coupling Rinse' valve on the external water delivery station so that the fresh water cleans both the Micromatic coupler and the line to the Transcal tank.
5. Turn the venturi 'ON' at 85psi.
6. The fresh water will now rinse through the Micromatic fittings to the Transcal tank and then into the main spray tank.
7. When there has been sufficient cleaning with fresh water (at least 5 minutes of cleaning), close the Envirodrum Coupling Rinse valve.

When finished:

- Turn the chemical probe valve 'OFF'.
- Turn the yellow 'T' handle 'OFF'.
- Turn the venturi valve 'OFF'.
- Ensure that the agitator valve is 'ON'.

Rinse the Transcal:

1. Continue to have the sprayer pump operating and the Transcal venturi system operating at 85psi.
2. Ensure that the tank is vented by turning the yellow 'T' handle on the Transcal station to 'EMPTY'.
3. Turn the 'Transcal Flush' valve on the external water delivery station 'ON'.
4. The tank and sight tube should be rinsed and the rinsate transferred to the main spray tank.
5. Rinse the Transcal tank for as long as recommended on the chemical label, or at least two minutes.
6. Close the 'Transcal Flush' valve when tank is sufficiently rinsed and the rinsate should all have been transferred to the main spray tank.

To vent tank:

1. Turn off venturi
2. Open probe ball valve
3. Open transcal ball valve to empty transcal
4. Vent for 30 seconds then close

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